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**Kilowatts, Megawatts and Power:  
Electric Territorialities of the State in the  
Peripheries of Ghana and Tanzania**

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**Doctor of Philosophy  
The University of Edinburgh  
2017**



## **DECLARATION**

I declare that this thesis has been composed solely by myself and that it has not been submitted, in whole or in part, in any previous application for a degree. Except where stated otherwise by reference or acknowledgment, the work presented is entirely my own.

Iván Cuesta Fernández

25 October 2017



## **ABSTRACT**

Recent years have brought a resurgence of state-led plans to expand access to electricity over African polities. Nonetheless, and in line with deep-seated patterns of infrastructural and general abandonment by the centre, very few of those plans have seriously addressed poor, distant, sparse and scarcely endowed peripheral regions. Those rare instances have received scant attention in the literature, despite their precious value to single out key interactions between national electricity regimes and core-periphery political linkages. Addressing that gap, this thesis pays attention to schemes of peripheral electrification to better understand how African states govern their peripheries. To that end, it scrutinizes two schemes of electrification: northern Ghana from 1989 to 2012, and southeastern Tanzania from 2004 to 2015. The thesis argues that in northern Ghana central rulers embarked upon electrification against the odds of geographical determinism, guided as they were by political motivations, chief amongst them the extraction of narrow electoral rents. By contrast, in southeastern Tanzania central rulers endeavoured to tap into the abundance of gas, governed by a determination to advance business models inscribed in the national electricity regime. Ultimately though, the central rulers in Tanzania were forced to re-politicize electrification to appease the deep local resentment caused by the very extraction of gas flowing toward the capital. Both cases thus illuminate varying trajectories in the interplay between national electricity regimes and core-periphery political linkages, that shaped the territorial strategies of electrification. In addition, this thesis also offers two revelations. One first revelation is that sub-national units exert significant mediations in the linkages between core and periphery, via alterations of distributional settlements. This goes against a stream of literature that pays attention exclusively to vertical strategies engineered from political rulers in the centre. The second revelation is that over the long-term electrification alters the political linkages between core and periphery. This squares well with the predictions of theories about the infrastructural power of the state. All in all, this work affords an embryonic analytical elaboration on the strategies of territoriality in the electrification of regional peripheries in Africa. From a political geography perspective, this helps to illuminate how sub-national electrification can simultaneously redraw and reinforce long-entrenched political linkages between core and periphery.



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In the last two academic years I did most of the writing up in my hometown of Valencia, Spain. The library of the Faculty of Industrial Engineering at the Universitat Politècnica de València, as well as its main library, became my workplaces. To a lesser degree, also the Social Sciences library at the Universitat de València; the Generalitat Valenciana's Hospital library, and the municipal libraries of Marxalenes and Orriols. To work at various of these libraries, I enjoyed access to the internet thanks to the unexpected (and perhaps unconscious) generosity of the Universidad Nacional de Educación a Distancia, which to this day continues to grant me access to the eduroam network even though I completed my studies there some years ago. In times when university budgets are being sacrificed at the altar of cost-benefit calculations, this largesse is duly appreciated. In Edinburgh, I benefitted immensely from the University's library. And during fieldwork, I made frequent use of a number of libraries: the Northern Region Regional Library (Ghana), the Mtwara Regional Library and the library of Stella Maris Mtwara University College (Tanzania), the National Central Library of Tanzania and the library of the National Museum and House of Culture in Dar es Salaam. As a library rat, I experienced an indescribable satisfaction amongst the shelves of these libraries. My most sincere gratitude to the Ghanaian and Tanzanian librarians who helped me with my research and, especially, to the staff of the National Central Library and to Fabian Kadamah of the library at Stella Maris Mtwara University College.

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## ACRONYMS

|          |   |
|----------|---|
| AfDB     | African Development Bank  |
| AMR      | Automatic Meter Reading   |
| BRN      | Big Results Now Initiative  |
| CCM      | Chama Cha Mapinduzi [Revolutionary Party of Tanzania]                   |
| CHADEMA  | Chama cha Demokrasia na Maendeleo [Party of Democracy and Development]  |
| CUF      | Civic United Front  |
| EAPP     | Eastern Africa Power Pool   |
| ECG      | Electricity Company of Ghana  |
| EWURA    | Energy and Water Utilities Regulatory Authority of Tanzania             |
| GDP      | Gross Domestic Product  |
| GEDAP    | Ghana Energy and Development Access Project                             |
| GERD     | Grand Ethiopian Renaissance Dam   |
| GHp      | Ghana cedis   |
| GHS      | Ghana cedis   |
| GRIDCO   | Ghana Grid Company Ltd.   |
| IMF      | International Monetary Fund   |
| IPP      | Independent Power Producer  |
| kVA      | Kilovolt-ampere   |
| kWh      | Kilowatt-hour   |
| LUKU     | Lipa Umeme Kadiri Utumiavyo [Pay electricity according to what you use] |
| MEC      | Minerals-Energy Complex   |
| MEM      | Ministry of Energy and Minerals of Tanzania                             |
| MoE      | Ministry of Energy of Ghana   |
| MP       | Member of Parliament  |
| MVA      | Megavolt-ampere   |
| MW       | Megawatt  |
| NDC      | National Democratic Congress  |
| NED      | Northern Electricity Department   |
| NEDCo    | Northern Electricity Distribution Company                               |
| NES      | National Electrification Scheme   |
| NORRIP   | Northern Region Rural Integrated Program                                |
| NPP      | New Patriotic Party   |
| PAYE     | Pay-As-You-Earn   |
| PNC      | People's National Convention  |
| PURC     | Public Utilities Regulatory Commission of Ghana                         |
| REA      | Rural Energy Agency of Tanzania   |
| SHEP     | Self-Help Electrification Programme                                     |
| TANESCO  | Tanzania Electric Supply Company  |
| TANROADS | Tanzania National Roads Agency  |
| TCCIA    | Tanzania Chamber of Commerce, Industry and Agriculture                  |
| TEMESA   | Tanzania Electrical, Mechanical and Electronics Services Agency         |
| TRA      | Tanzania Revenue Authority  |
| TVA      | Tennessee Valley Authority  |
| USAID    | United States Agency for International Development                      |
| VALCO    | Volta Aluminium Company of Ghana  |
| VAT      | Value Added Tax   |
| VRA      | Volta River Authority   |



# 1 Introduction: African peripheries and the territorial politics of universal electrification

With the benefit of three decades of hindsight, James Ferguson evoked, not without bitterness, how ‘in the mid-1960s, everyone knew, Africa was “emerging”’ (Ferguson 1999, 1). And African regions such as Zambia’s Copperbelt certainly did emerge, for some time. In seeking more solid economic grounds, once having secured the political kingdom, Zambia was not alone. An extensive catalogue of African regions thrived on a wave of extractive and industrial zeal. Thanks to vigorous industrialization, or so it was then anticipated, the material as well as the more philosophical dividends of modernity would soon reach the now liberated nations. In few domains was industrialization-cum-modernity more firmly pursued than in electricity generation (Amann 1969; Miescher and Tsikata 2010; Scudder 2005; Showers 2009, 2011). In January 1966 Kwame Nkrumah cut the ribbon on the formidable 912-MW Akosombo Dam. Fourteen years earlier he had already described Akosombo and the overarching Volta River Project as a ‘gigantic project for the industrial development of our country – a scheme that can change the face of our land and bring wealth and a higher standard of living to our people’ (Miescher and Tsikata 2010, 19). Akosombo was a gigantic undertaking, but hardly a unique specimen in the decades that followed independence. Thus, for instance, in December 1968, Nigerian authorities commissioned the 760-MW Kainji Dam; in November 1972, amidst great fanfare Mobutu Sese Seko inaugurated the 351-MW Inga I, the relatively modest predecessor of the gargantuan 1424-MW Inga II set to energize an avowed ‘Congolese Ruhr’; lastly, in November 1975, Julius Nyerere inaugurated the first of two dams pertaining to the Great Ruaha Power Project, a scheme that would ultimately increase Tanzania’s hydroelectric capacity to a modest yet still useful 200 MW. All in all, African countries built 54 hydroelectric dams in the 1970s and 1980s in a deliberate effort to

spur industrialization (Öhman 2007; Showers 2011). After that, the vigour of industrialization faded throughout the 1990s and early 2000s, as did economic growth. However, in December 2011 a source less perceptive in the analysis of African affairs than James Ferguson declared the continent to be 'rising' again (The Economist 2011). Alongside the 'new rise' came a renewed faith in industrialization, typically but not exclusively professed by eminent African rulers such as the Ethiopian Prime Minister Meles Zenawi, the Rwandan President Paul Kagame and the Ugandan President Yoweri Museveni. Meles Zenawi was singularly vocal in his unwavering faith in the association of industrialization, growth and electricity. His faith came to fruition as a programme of massive hydroelectric expansion in Ethiopia. The programme soon emerged as a pillar of the national development strategy, but also, in equal measure, of the regime's ideological narrative (Menga 2017; Verhoeven 2013). The ambitious programme of hydroelectric schemes implemented by Ethiopian authorities since 2004 first intended to multiply the installed capacity between 2010 and 2015 by five, and then, to double that capacity between 2015 and 2020 (FDRE 2016). Mid-December 2016 saw dam construction reach a new climax. Two thousand guests attended the inauguration of the imposing 1,870-MW Gilgel Gibe III dam. By the middle of the same year the Ethiopian government also declared that it had completed 70% of the Grand Ethiopian Renaissance Dam (GERD), an outstanding achievement itself, given the sheer size of the barrage (6,000 MW, or about six Akosombos). As works at the site of the GERD progressed, authorities presented the water of the Blue Nile as the liquid manna that would pull Ethiopia from its dire poverty into a promised land of electric abundance and, as already substantiated, of lucrative exports to neighbouring countries (World Bank 2012). In earlier ceremonial inaugurations of dams, as well as in the annual accounts of the progress of works of the GERD, the words of the late Meles Zenawi, whom the state-owned media accorded a stature equivalent to the Nkrumahs and the Mandelas of Africa, resonated. The press statement for the inauguration of Gilgel Gibe III recalled the professed association between mega-dams and economic development embraced by the so-declared architect of Ethiopia's renaissance. Once again, the state news agency quoted his strongly-worded reproach to the foreign critics of Gilgel Gibe III six years earlier: 'They don't want to see developed Africa; they want us to remain undeveloped and backward to serve their tourists as a museum' (MFA 2016). The association between electrification, development and industrialisation is hardly exclusive of Ethiopia, though. Other parts of Africa are also subject to a wider 'electric scramble' in

generation and transmission (Schölvén 2015). This flurry in generation and transmission is underpinned by a return to statist high modernism (Dye 2016; Kraak 2012; Mains 2012), along lines not too dissimilar to the developmentalist aspirations enshrined by Akosombo and Inga in the 1960s and 1970s.

However disputable the African 'rising' narrative may be, the expansive economic cycle fuelled by the commodity boom of the 2000s has undeniably been accompanied by a renewed interest in universal electrification. In the more solid economies of South Africa or Kenya, but also in 'development darlings' such as Mozambique or Tanzania, foreign investors have made some headway into the generation segment, multilateral donors have renewed their willingness to lend to energy ministries, and hitherto ailing regional power pools have been resuscitated. The renaissance of regional electricity exchanges and of utility associations has gained particular traction in East Africa, where a series of interconnectors are either planned or under construction (notably, the Ethiopia-Kenya interconnector) (EAPP 2011).

Renewed interests in universal electrification is already delivering some results. From 2000 to 2014, the rate of access to electricity in sub-Saharan Africa rose from 26.5 to 37.5%. Regrettably, this increase was outpaced by population growth, making sub-Saharan Africa the only region in the world in which the absolute figure of population without access to electricity has increased from 2000 to 2014 (World Bank 2017). Nonetheless, the continent-wide figure does not do justice to the intense progress in a selected set of countries. Between 2000 and 2014, access in Botswana grew from 27 to 56%; in Senegal, it soared, from 37 to 61%; and in Cote d'Ivoire, from 48 to 62%. Amongst the countries starting from a very low level of electrification, Ethiopia doubled its rate from a dismal 13 to 27% and Kenya drove up access from 16 to 36%. Most impressively, in Ghana, access skyrocketed from 45 to 78%, prolonging the steady pattern of growth set in motion by the National Electrification Scheme (NES) 1990-2020 (World Bank and IEA 2017).<sup>1</sup> As a consequence, in 2014, five countries south of the Sahara had attained rates of access above 60%: Gabon (89%), South Africa (86%),

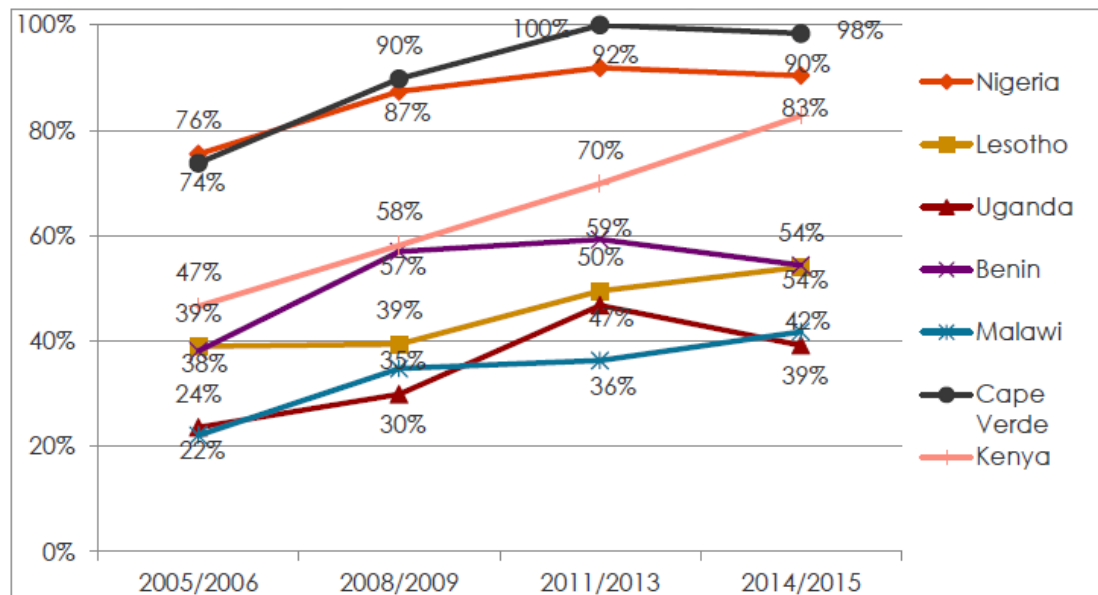
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<sup>1</sup> It is important to bear in mind that access does not necessarily translate into availability of electricity, as reliability can be, and often is, poor in most African countries. For a continent-wide discussion about the extent of interruptions in supply and its attendant costs, see Tallapragada et al. (2009).



Ghana (78%), Equatorial Guinea (68%) and Cote d'Ivoire (62%).<sup>2</sup> Figure 1 displays the most remarkable examples of progress in grid extension over the 2005-15 period. The improvement in reach in some countries, notably in Kenya, is considerable.

**Figure 1: Trends in access to grid electricity in selected African countries, 2005-2015.**



Source: Afrobarometer (2016).<sup>3</sup>

### 1.1. Why peripheral electrification matters for territorial politics

The present flurry of electric developmentalism in Africa echoes a number of historical experience. In the 1920-40s, rural America was incorporated to the national economy via the acquisition of millions of household electric appliances (Brigham 1998; Glaser 2009; Mock

<sup>2</sup> High rates of access in Gabon and Equatorial Guinea can be largely attributed to the combined influence of: abundance of cheap fuels, tiny size, high urbanization, and almost total urban access.

<sup>3</sup> Access rates in the Afrobarometer study are considerably higher when compared to other surveys of availability of electricity. The Afrobarometer equates access to electricity with 'access to an electric grid, ie living in an area where electricity services are available' (Afrobarometer 2016, 5). But, as the study of unconnected 'under grid' households in Western Kenya shows (Lee et al. 2016), the upfront costs of cabling and connection fees may leave half of rural households within 200 metres of the grid unserved.

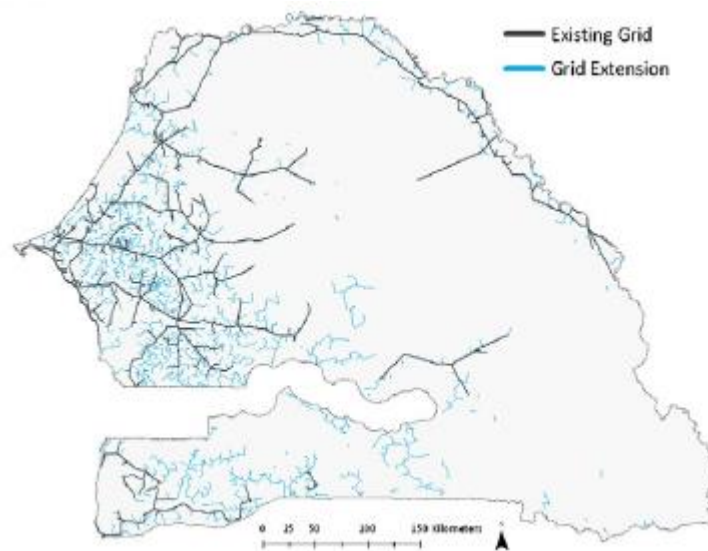
2014; Nye 1998). Roughly at the same time, the electrification of British-ruled Palestine advanced a singular project for the relations between Arabs and Jews (Meiton 2015; Shamir 2013). Equally, electricity was key to pre-war and post-war reconstruction in Britain (Luckin 1990), as well as to rural development in Ireland (Shiel 1984). In the four decades of Franco's dictatorship in Spain, hydroelectricity played a crucial role in affirming the nationalist and developmentalist project (Swyngedouw 2007); along similar developmentalist lines, Ethiopia recently launched her bid to become a regional powerhouse (Cuesta-Fernandez 2015). In a different direction, the electrification of slums and long-underdeserved areas was crucial to redress the injustices of South Africa under apartheid (Bekker et al. 2008). Lastly, and on a larger scale, the massive industrialisation of strategically selected regions of the Soviet Union was crucially premised on electrification (Coopersmith 1992). More generally, electricity has reproduced the capacity of networked infrastructure to assert state authority in various forms (Hughes 1993; Kaijser, van der Vleuten, and Högselius 2016; Verbong and van der Vleuten 2004; van der Vleuten and Kaijser 2006; Weber 1976).

State drives to provide universal access to electricity in Africa are particularly interesting for the examination of territorial politics. To state the obvious, universal electrification inevitably entails electrifying the most remote peripheries as well. Given that electrifying African peripheries rarely pays off in terms of cost-benefit analysis (the economic case for electrification is often fragile or non-existent), the few instances in which this happens are symptomatic of alternative calculations, often of a political tenor. Peripheral electrification in Africa therefore speaks to the formation of fresh political interactions connecting political centres and peripheries between state rulers, industrial interests, local elites and citizens.

Regrettably, the 'electric scramble' in operation over sub-Saharan Africa has by and large overlooked the peripheral regions of the continent, with only a few laudable exceptions. Thus, exactly ten years before the inauguration of Gilgel Gibe III, a more circumspect inauguration took place in the previously peripheral town of Mtwara, Tanzania. A private company, Artumas, commissioned a modest 12-MW gas-to-power plant fed by newly exploited wells in the Ruvuma Basin of southeastern Tanzania. In due time, the plant facilitated the expansion of a regional grid over an area the size of Rwanda, and the attending surge in household connections. The general picture nonetheless points in the opposite direction. In 2014, electricity reached only 17% of rural dwellers in Africa, up from 7.5% in 2000 (IEA 2002; World Bank and IEA 2017). Even worse, as it has been demonstrated for

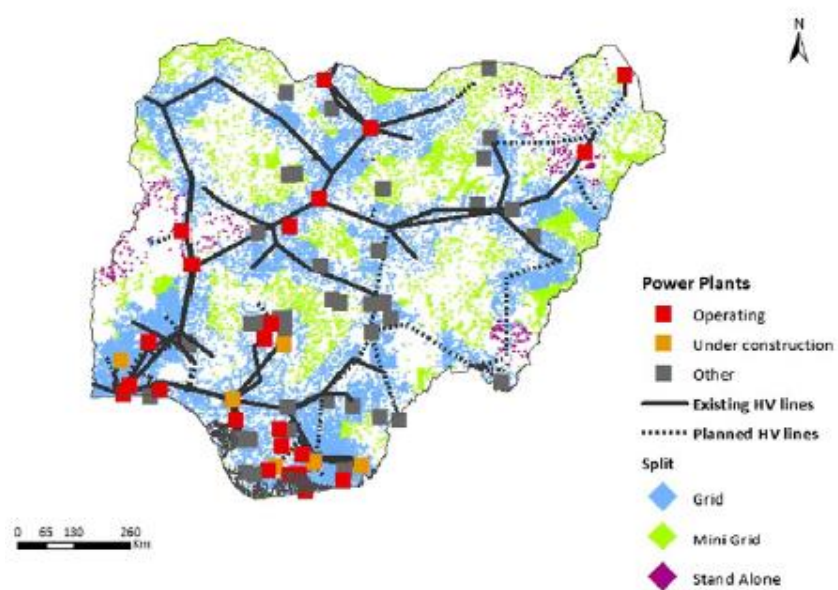
Senegal between 1995 and 2001, poor and rural households were not always the main beneficiaries of the expanded network (Boccanfuso, Estache, and Savard 2009). In the same outperforming countries cited above, rural access - a decent proxy for peripheral electrification - almost stalled. In Ethiopia, rural access in 2014 was 12%; in Kenya, 13%. Senegal and Cote d'Ivoire fared somewhat better, with 33 and 37%, respectively. Again, Ghana outclassed its neighbours. Rural access stood at a splendid 63%, only second to South Africa in the landmass of sub-Saharan Africa (71%) (World Bank and IEA 2017). The even growth of access in Ghana across urban and rural areas can generally be attributed to a sustained endeavour to bring electricity to its long-marginalized peripheries (GoG 2012; Kemausuor and Ackom 2017). Equally ambitious on paper but slightly less successful so far in reality has been the rural electrification programme in Senegal. The programme aspires to attain a rural rate of electrification of 60% by 2022, and has already yielded some measure of progress, notably in creating 18 regional concessions that substantiate the government's aim to transcend the accustomed geographical reach of electricity in the country (Mawhood and Gross 2014). In Kenya, despite sizeable public investment in the extension of the national grid, rural access in the west has failed to catch up due to the inability of 'under grid' households to pay the costly connection fees (Lee et al. 2016). All in all, even in the scenario of substantive state efforts to increase access, its geographical pattern is set to remain spatially uneven, as the figures 2, 3, and 4 for Senegal, Nigeria, and Ethiopia, respectively, illustrate. In all three countries, like in most African polities, the national grid is expected to leave vast, sparsely populated swathes of the national territory uncovered, set to be served by off-grid technologies. The scarce experiences in which African states have ventured into their peripheries by extending the electric grid acquire a singular analytical value.

**Figure 2: Future extension of the grid in Senegal (best case scenario, 2x current demand).**



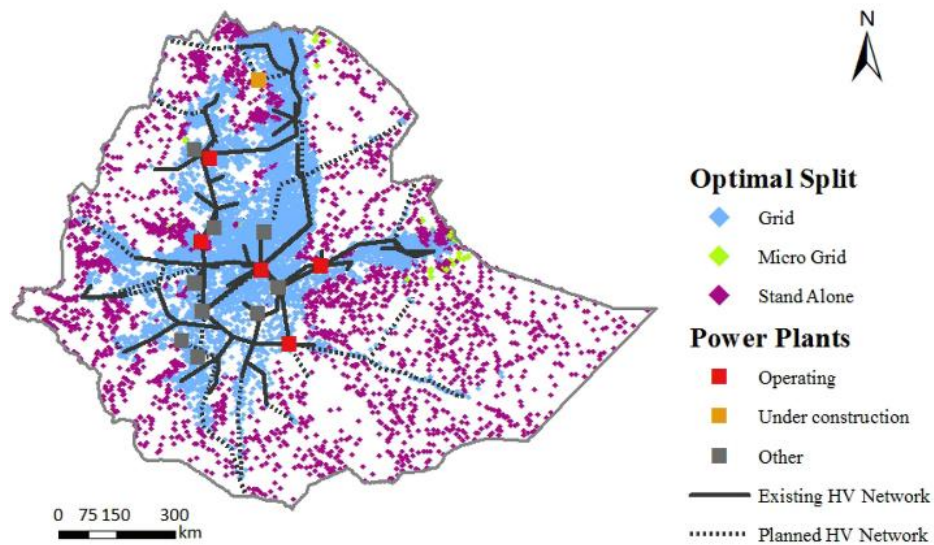
Source: Sanoh et al. (2012).

**Figure 3: Optimal geographical distribution of the electrification mix in Nigeria.**



Source: Mentis et al. (2015).

**Figure 4: Optimal geographical distribution of the electrification mix in Ethiopia (moderately lower threshold in rural consumption).**



**Source: Mentis et al. (2016).**

The literature has paid scant attention to the electrification of peripheral regions in Africa. More often than not, peripheral electrification is inserted as a vignette in all-encompassing reports about the transformation, or lack thereof, of African power regimes (Bernard 2010; Eberhard et al. 2008; OECD and IEA 2014). In a similar vein, the studies reviewing the ambitious universal access programmes in South Africa, Ghana, Ethiopia, Senegal, Rwanda and others are found wanting in geographical or sub-national perspective (Bekker et al. 2008; Bhattacharyya 2013a; Diouf, Pote, and Osei 2013; Kemausuor and Ackom 2017; Lenz et al. 2017). Only those scholars with an interest in the connections between electrification and electoral patterns have felt more inclined to consider sub-national units and rural peripheries in their surveys (Bawumia 1998; Briggs 2012; V. Kroth, Larcinese, and Wehner 2016; Rosenzweig 2015). In short, recent electrification crusades over sub-national *Afriques inutiles* remain virtually uncharted by the academia, frequently under the facile invocation of geographical determinism.

## **1.2. Argument of the thesis and relevance**

Against this empirical background, this thesis addresses the question of how African states govern their peripheries by examining the implications of large-scale electrification in territorial politics. To do so, it scrutinises two decades of extension of the power grid in northern Ghana (1989-2012) and ten years in southeastern Tanzania (2004-15). By so doing, it aims to unveil the political linkages between centre and periphery that accompany large-scale grid electrification. The analysis reveals that in northern Ghana the dominant core-periphery linkage that emerged in association with electrification was the search for narrow electoral gains; whereas for southeastern Tanzania, it was the impulse given to electrification as a compensation against widespread local grievances expressed about the extraction of gas from the region.

Drawing inspiration from political explanations of peripheral electrification in Africa, the central argument in this thesis is as follows. Central political elites endeavour to overcome the challenges posed by the triad of distance, demography and poor endowments. In so doing, they are moved by (at least) four drivers, sometimes in combination. These drivers are: a) electoral calculations; b) legitimacy building; c) regional economic reengineering and d) strategic bargains with authoritative sub-national elites (eg around local infrastructural grievances). In peripheral regions, strategic bargains between central rulers and citizens at large are paramount, as the latter may force central rulers to respond with electrification policies. At the same time, the core-periphery linkages associated to peripheral electrification unravel against a background of sectoral policies, largely determined at the national scale. Sectoral policies respond to the political economy of electricity, which involves fierce disputes for the adjudication of distributional issues. Key distributional issues include: how much each category of customers pays for the electricity it gets; what cross-subsidies (if any) are allowed between categories of customers; and what (if any) is the contribution of the state to the costs borne by customers. The adjudication of distributional issues between the parties in dispute becomes palpable both functionally and territorially, that is, in spatial patterns of distribution of access as well as in the adjudication of cross-subsidies across regions, respectively. Spatial patterns and regional cross-subsidies are highly inertial, and their imperviousness to change in the short term defines periods marked by the hegemony of a particular distributional settlement.

This thesis hypothesises the causal mechanism underpinning the process described above as the complex articulation of two forces at play, namely core-periphery political linkages and sectoral policies on electricity that stem to a large extent from distributional settlements. On the one hand, in territorial terms, heightened core-periphery political linkages structure the patterns of electrification in peripheral regions. Initially, core-periphery political linkages (eg electoral gains, legitimacy building, etc) become intense enough to trump uninviting geographical factors (eg distance, lack of income, etc). Once established, core-periphery political linkages act as a structuring influence upon the policy process that adjudicates public policies of access and provision of electricity. Tellingly, patterns in peripheries diverge substantially from those encountered in core and semi-peripheral regions (even after the differentiating effects of disparate geographical factors between core, semi-peripheral and peripheral regions are considered). On the other hand, in functional terms, the sectoral policies associated to the dominant distributional settlement in each period align or countervail the influence of core-periphery linkages. In the first case, sectoral policies reduce the room for manoeuvre for political calculations, whereas in the second the opposite is true. However, that core-periphery linkages and distributional settlements do not operate independently. As this thesis will make evident, both may evolve over periods of one or two decades, particularly because of global processes and donor-recipient relations. Accordingly, it is the sequential examination of the combination of both which provides a cogent explanation for the territorial patterns associated to large-scale peripheral electrification.

The relevance of the argument presented in this thesis is twofold. For policymaking, interest groups and social movements aiming to influence the policy process in Ghana and Tanzania may derive a deep understanding of the political calculations that shape schemes toward universal electrification in both countries, and therefore formulate their strategies accordingly. By contrast, the reception of the argument by policymakers in the narrowest sense (ie officials in ministries, Members of Parliament, regional and local authorities) is likely to be less favourable. Not in vain, policymakers build up their legitimacy on the self-professed technocratic nature of their expertise and practice. Therefore, they see with apprehension arguments that to a certain extent compel them to engage with their political dimension of their work. For scholarship, this thesis yields a nuanced description of the mechanisms that restructure the relations between political centres and peripheries in Africa by means of an allegedly apolitical process, ie electrification. By addressing the question of how African

states govern their peripheries, the thesis situates the territorial implications of big infrastructure within a body of literature in Africanist Political Geography that has since long interrogated itself about the narrow integration of peripheries, the continuities across pre-, colonial and post-colonial eras in the projection of authority over space and the social contracts and political bargains that bond centres and sub-national units in Africa. In addition, the argument also speaks to scholarship beyond African Studies. It helps to answer the question of how state-society interactions across national territories shape statebuilding via three phenomena: the affirmation of state infrastructural power, the articulation of social contracts with sub-national units, and the political bargains between central rulers and regional elites and citizens.

### **1.3. Methodology**

At about the same time when Africa was first 'emerging', Barrington Moore (1966) published his most acclaimed work, *Social Origins of Dictatorship and Democracy*. Ten years later, Theda Skocpol (1979) did likewise with *States and Social Revolutions*. In short time, Moore's 'no bourgeoisie, no democracy' and Skocpol's 'bring the state back in' (1985) one-liners gain popularity amidst political analysts as catch-phrases for their respective conclusions. But how did both manage to mine their parsimonious findings out of mountains of historical evidence? The answer lies in part in their identification of causal claims from the systematic comparison of historical sequences (Falleti and Mahoney 2015; cf. for a more circumspect assessment, see Tilly 1995). Moore and Skocpol drew upon a rich tradition of comparative-historical analysis. Tocqueville (1845) and Weber (1949, 1968) were but two illustrious predecessors employing varieties of the comparative-historical method (Mahoney and Rueschemeyer 2003b; Ragin and Zaret 1983). Moore and Skocpol set the tone for a revitalization of comparative-historical analysis from the mid-1980s onwards. In so doing, they preceded the outstanding comparative works of Charles Tilly (state formation in Europe), Jack Goldstone (revolutions), Peter Evans (state-society relations), Henrik Spruyt (competition between state and other institutional forms in Early Modern Europe), Ruth and David Collier (labour movements and regimes in Latin America) and Gøsta Esping-Andersen (welfare regimes) (Mahoney and Rueschemeyer 2003a; Mahoney and Thelen 2015). Importantly, Moore, Skocpol and their more accomplished successors shied away from



positing rigid and static frameworks. As Sewell (1996) presciently commented in his review of Theda Skocpol's *States and Social Revolutions*, if the argument of the book had relied solely on comparing variables, 'there would have been no need to write a long book; a brief article with a few simple tables would have sufficed' (262, cited in Mahoney 1999). Or, as King, Keohane and Verba (1994) remind their readers, causal hypotheses and in-depth case description are complementary, not competitive. Similarly, a profound knowledge of the context enhances conceptual validity (Ragin 1989). The point here is that proper comparative-historical analysis is by no means a synonym for rigid invariant models that are blind to path, time and situation-dependency. Accordingly, sensible, balanced comparative-historical analysis cannot be either an epistemological blind alley or 'a waste of time' (Tilly 1995, 1605). At its core, the comparative-historical method is a tool for contrasting sequences of events. This method is also known as the comparative sequential method (Falleti and Mahoney 2015). The difference between both is not trivial, however. The latter generalizes the method from historical to recent and contemporary phenomena. Indeed, this thesis uses the comparative sequential method to examine recent events.

The comparative sequential method has many advantages. One is its specific 'concern with causal analysis, an emphasis on processes over time, and the use of systematic and contextualized comparison' (Mahoney and Rueschemeyer 2003b, 10). A further advantage is its use of 'structured, focused comparison' (George 1979) to discipline the selection of variables, contrast analytically equivalent phenomena, and collect the same data across cases (where possible). Finally, in its use of case studies, comparative-historical analysis is also quite valuable to explore causal mechanisms (not laws) and deriving new hypotheses (George and Bennett 2004). This falls in line with the realization that, 'Comparative politics has moved away from ontologies that assume causal variables with strong, consistent, and independent effects across space and time toward ones that acknowledge more extensive endogeneity and the ubiquity of complex interaction effects' (P. A. Hall 2003, 387). In fact, embedded in the comparative sequential method, indeed in comparative methods in general, there is always a latent risk of reifying causal relations, impoverishing the analysis by overlooking crucial contextual information (ie, intervening variables, ordinal factors or path-dependencies) and over-relying on small-N designs (King, Keohane, and Verba 1994; Lijphart 1971, 1975; Smelser 1976). A partial solution may be to move away from rigid

variable-oriented research and towards case-oriented research (Della Porta 2008; Ragin and Zaret 1983).

Applications of the comparative sequential method to the sub-national scale are particularly promising. Guillermo O'Donnell (1993, 1999) compellingly used this approach in his analysis of 'blue', 'green' and 'brown' areas of rule of law in Latin American countries; likewise, Jeff Goodwin (2001) foregrounded unevenness in the sub-national reach of the state as an explanatory factor in the success of modern revolutions. For the political geography of electrification, sub-national comparative sequential analyses hold the promise of addressing two issues of import, namely uneven geographical development and centre-periphery relations, via 'within-nations comparisons' and/or 'between-nations comparisons' (Snyder 2001). This is exactly the research design of two major works exploring the political geographies of sub-national electrification (both in India): Sunila Kale's *Electrifying India* (2014) (inter-regional comparison), and Criqui and Zérah's *Lost in Transition?* (2015) (intra-urban comparison).

This thesis is considerably more modest in aims than Moore's and Skocpol's major works, but finds inspiration in their comparative sequential method. It also takes its cue from Kale's and Criqui and Zérah's methods and themes, whilst aspiring to expand their analytical scope. To do so, this thesis explores the trajectories of grid electrification in two peripheral regions of Africa, namely northern Ghana from 1989 to 2012, and in southeastern Tanzania from 2004 through 2015. Exploring these two trajectories, it seeks to single out the effects of 'ideal types' of trajectories (ie electoral and grievance-driven) pre-identified by the literature. In so doing, the comparative design is twofold. For the analysis, each case study is split into two sequences: 1989-2000 and 2000-12 in northern Ghana; and 2004-12 and 2012-15 in southeastern Tanzania. The first, within-cases dimension of the comparison follows the variation between sequences in each case study in search of the effects of core-periphery political linkages upon electrification. The second, between-cases dimension compares the two cases to trace the influence upon electrification of the main differential variable, ie absence and presence of resource endowments in northern Ghana and southeastern Tanzania, respectively.

To unveil how this process unfolds, this thesis uses a methodological design that runs from outcomes to strategies, and then from strategies to core-periphery linkages (see figure 5

below). First, regional patterns of access and adjudication of subsidies are empirically established by analyzing two temporal sequences in northern Ghana (1989-2012) and southeastern Tanzania (2004-2015). Second, such patterns are traced back to distinctive policies designed for the two peripheries. As these policies are at odds with cognate policies for other regions, they can hardly be attributed to nationwide electricity policies. Instead, this hints at the presence of additional causal factors. This thesis suggests that two core-periphery political linkages, electoral calculations and infrastructural grievances, may be the additional causal factors at play in the cases of northern Ghana and southeastern Tanzania, respectively. This study serves to build a hypothesis on the causal role of core-periphery linkages for further analysis.

The choice of northern Ghana and southern Tanzania is justified on various grounds. First, both regions have long been widely considered peripheral in their countries (B. Kelly and Bening 2007; Seppälä and Koda 1998). Second, they have been administered sustained programmes of grid electrification. The grid was extended to the northern Ghana in the 1990s, whereas in southeastern Tanzania (ie the Lindi and Mtwara regions) an isolated regional grid covering an area of the size of Rwanda coalesced in a few years after 2004. Consequently, the analysis follows, on the one hand, the northern component of the NES 1990-2020 in Ghana, and, on the other hand, the Mtwara Energy Project 2004-2012, and the retroversion and operation of all electricity assets to the state in southeastern Tanzania after 2012. All in all, the two regions, each studied in two consecutive periods, yield four observations for the comparative analysis. Third, northern Ghana and southeastern Tanzania constitute two of the few, uncommon, 'deviant' examples of sustained grid electrification in peripheral regions of sub-Saharan Africa in recent times. And fourth, and in connection with theories of regional electrification (Brown and Mobarak 2009; Coopersmith 1992; Kale 2014; Min 2015), these two cases seem to be propelled by the calculations of state actors in the centre, yet they also partially respond to the agency of citizens in the peripheries, not of well-organized sub-national elites, such as farmers or industrialists, or regional growth coalitions (unlike most of the literature on the topic; thus the singularity, *a priori*, of Africa). Consequently, northern Ghana and southeastern Tanzania are singularly apt to observe the impact of core-periphery linkages between the central state and peripheral citizens upon sub-national grid electrification (a sub-field extensively neglected by the literature cited above).

Overall, this thesis makes four chief methodological choices in:

- 1) Seeking to identify ideal types of trajectories of grid electrification with the help of the comparative sequential method, as explained above.
- 2) Picking sub-Saharan Africa as the universe of potential cases of study. As the next chapter will show, the available literature on the political geographies of peripheral grid electrification has paid scant attention to Africa. This, by itself, would justify the choice of this continent as the broader geographical unit of analysis. But, moreover, sub-Saharan Africa is the continent where sub-national, regional disparities are more acute. This offers one major benefit, namely a rich repertoire of potential case studies (ie peripheral regions).
- 3) Choosing the (two) case studies deductively according to available theory (Blaikie 2001). Theories of peripheral grid electrification (reviewed in the next chapter) point to electoral calculations, response to grievances and regime legitimacy building as three major drivers of the phenomenon. Accordingly, this thesis picks case studies that may, in line with a preliminary assessment, conform to one of these ideal types. At the same time, this thesis aspires to expand the theoretical scope of these theories by looking at a subtype of processes of electrification almost completely overlooked by existing inquiries: regions in which sub-national coalitions are weakly organized and poorly integrated in the political system. For this purpose, again, the African context offers unique potentialities.
- 4) Combining qualitative and quantitative techniques. The goal is not to triangulate, but to combine a variety of techniques to the advantage of better addressing the research problem (Blaikie 1991; Miles, Huberman, and Saldaña 2014) in line with mixed-method designs (Creswell 2003; Greene, Caracelli, and Graham 1989). The research problem asks about the whys and hows of peripheral electrification. Both interrogatives are dealt with in keeping with a 'sequential exploratory design,' ie a 'qualitative -> quantitative -> results' chain (Creswell et al. 2003), or, equivalently, a 'QUAL -> quan design' (Morse 1991). Thus, to answer 'why peripheral electrification,' qualitative techniques (principally, semi-structured interviews and documentary analysis) serve to identify in the cases under study the political factor(s) suggested by the literature [chapters 3 & 4]; the presence of these political factor(s) is later established with the help of a quantitative analysis of the territorial patterns of

electrification at the district (sub-regional) level [chapters 3 & 4]. Likewise, to answer 'how peripheral electrification proceeded,' qualitative techniques establish the influence of distributional settlements in the national electricity regime (about regionalized subsidies) [chapter 5], whilst quantitative techniques (looking at the regional and sub-regional scales) subsequently complement the analysis by considering the effects of the agency of sub-national distribution utilities (about pre-paid meters) [chapter 6]. All in all, in combining qualitative and quantitative techniques the sequential exploratory design prioritises the former (Creswell et al. 2003). To connect political factors, territorial strategies and spatial patterns, the methodology follows back the policy process represented in figure 5 below: from identifying territorial outcomes to territorial strategies and from then backward to core-periphery political linkages.

The findings draw upon a combination of techniques of data collection:

- a) For qualitative data, 60 semi-structured interviews in Ghana and 42 in Tanzania. Interviews in Ghana were held between August and November 2013 in Accra (ministry, headquarters of utilities, key informants in the energy sector), Tamale (headquarters of northern distribution utility) and Bolgatanga (utility regional office, development practitioners, local stakeholders in electricity sector), whilst interviews in Tanzania were conducted in Dar es Salaam (ministry, headquarters of utility) and Mtwara region and district capitals (utility regional office, local stakeholders, development practitioners). The full list of informants is presented in the appendixes. Also, basic legislation and sectoral policies issued by energy ministries, regulators and other public agencies were reviewed to identify key changes in policy orientations throughout the period analysed. One timeline for each country was produced reflecting the evolution of sectoral policies and orientations.
- b) For quantitative data, three major groups of datasets were assembled. One group of datasets contains statistics about rates of access to electricity at national, regional and district levels produced by the national statistical offices. In Ghana, the main source were the national and regional reports produced by the Population and Housing Census 2010 and, to a lesser extent, the Ghana Living Standards Survey of 1991-92 as well as the Demographic and Health Survey of

1993. All were issued by the Ghana Statistical Service (GSS). Data rates for other years, as referred in this thesis, were collated from various reports and conference papers and presentations by staff from Ghana's Ministry of Energy and Petroleum. For Tanzania, the major source of data was the National Bureau of Statistics (NBS), in particular the Regional and District Census of 2004 and the Energy Access Situation Report of 2016. In some cases (eg Mtwara and Lindi regions), these datasets were complemented with data obtained from the annual budget speech of the Minister of Energy. All the quantitative datasets referred above were obtained from the Internet. The second group of datasets was compiled with data from the Northern Electricity Distribution Company (NEDCo), in Ghana, and the Tanzania Electric Supply Company (TANESCO), in Tanzania. NEDCo's dataset includes: number of customers, billed energy, billed revenue, energy losses, amongst others. A subset of data includes similar figures for prepaid meters. Figures are disaggregated either by 'station' (ie local operative unit, roughly assimilable to district level) or administrative region. More general figures are available from 1990 through 2012; and more detailed for July 2013. TANESCO's dataset offers approximately 100 indicators covering various dimensions of operations, ie financial, technical and managerial. It consists of a dataset collated by the headquarters in Dar es Salaam and consolidated from the monthly reports submitted by each Regional Office. The dataset covers the years 2004 through 2013. Other datasets from TANESCO include internal reports monitoring the progress of rural electrification projects. Lastly, the third group of datasets includes the electoral results in both presidential and parliamentary elections in all the districts of the three northern regions of Ghana, and the regions of Mtwara and Lindi in Tanzania, in the period 2000-2008 and 2000-2015, respectively. It is also worth mentioning that the Tanzania Revenue Authority kindly provided access to its database of direct and indirect tax collection in the Mtwara region from the fiscal years 2005/06 to 2013/14. Also, a small dataset was constructed to track the evolution of electricity tariffs for different categories of customers during the years under scrutiny.

Access to a few categories of informants proved challenging. As reflected in the appendixes, access to top policymakers in the ministries of energy in Ghana and Tanzania was less than optimal. In Accra, the assistance of a ‘gatekeeper’ (a consultant to the ministry and former manager in a number of ministerial programmes) was crucial. In Dar es Salaam, access was obtained through formal letters submitted via official registries, as well as with the help of previous informants in TANESCO. The information yielded by these interviews, however, was only partially helpful, as the most senior informants remained firmly loyal to the official line of thought reflected in the policy documents. Overall, the consequence of the restrictions in access to informants in the higher echelons of the ministries affected the results in two directions: first, it enlarged the presence of other actors in the power sector, especially electric utilities’ staff (present and former) and sectoral experts; and second, it partially shifted the focus of the project, which became less state- and electricity-centric, thus paying more attention to the overall developmental contribution of the electrification schemes. The latter was achieved by including the voices of experts in development (ie development practitioners) and querying regional and local authorities about their views on the topic.

Finally, data analysis combined quantitative and qualitative methods. The quantitative analysis sought to identify potential overlaps between outlier districts, according to unexpected relations between rates of access to electricity and population density (as suggested by the literature), and electoral patterns. This was done with the help of a graphic representation of both variables (access and population density) along two axes (see chapters 3 and 4). The qualitative analysis was carried out according to basic techniques of content analysis. Using the Sonal software, the interviews were coded by segments according to a set of pre-defined tags extracted out of the literature on the politics of electricity supply reviewed in chapter 2. On a first stage of analysis, the codes, organised in colors, served to contrast the views of different informants on the same topics. Subsequently, the same codes from different informants were consolidated under unique topical accounts, to be contrasted with the results from the quantitative analysis.

#### **1.4. Structure of the thesis**

This introduction has presented the analytical value of large-scale electrification in regional peripheries to answer a salient question in Africanist Political Geography: how do African states govern their peripheries? It has been found that schemes of electrification in the peripheries, being uncommon, can provide an excellent vantage point to consider how political strategies of electrification may overcome the economic case against peripheral electrification, premised on geographical, demographic and other factors. The rest of the thesis aims to explore this point.

Chapter 2 reviews the literature in search of answers to two questions. The first question interrogates the core-periphery linkages that coalesce around (and shape) the public provision of electricity in regional peripheries. This question is explored by reviewing a broad set of studies concerned with the electoral politics of electricity, regional schemes of electrification and the links between electricity and statebuilding. The second question concerns itself with the political economy of electricity in Africa and, in particular, with the consolidation of distributional settlements between various interests as a result of regularities over time in sectoral policies. Chapter 2 reveals two major threads that guide the analysis in subsequent chapters: first, that in order to proceed with the electrification of their regional peripheries, states invariably need to put in place distinct territorial strategies; and second, that these strategies coalesce around core-periphery political linkages and distributional settlements between the state, industrial interests and citizens.

Chapters 3 to 5 flesh out the theoretical analysis with empirical evidence. Chapters 3 and 4 interrogate the delivery of access in northern Ghana (chapter 3) and southeastern Tanzania (chapter 4), whilst chapter 5 compares the subsequent routine provision of electricity in both cases. Accordingly, chapters 3 and 4 undertake an independent comparative longitudinal analysis. This is done to unearth the temporal variations in the politico-territorial strategies that are present in each case. Chapter 5 undertakes a cross-section analysis of northern Ghana and southeastern Tanzania. In this chapter, the aim is foreground the influence of the chief difference between both cases, namely the availability of resource endowments, ie gas in southeastern Tanzania.

Chapter 6 explores how the organizational goals of distribution utilities operating in the peripheries alter the overall course of the strategies devised in the political centre. Like in the preceding chapter, the analysis embarks upon a cross-country comparison. To gain a



sharper focus, chapter 6 concentrates on the deployment of prepaid meters. According to the literature, prepaid metering impinges upon existing distributional settlements, particularly for the most destitute and distant citizens, as prepaid metering has the capacity to quell existing informal cross-subsidies. In keeping with this, the chapter explores the degree and the pace of introduction of prepaid meters in the two regions.

Finally, chapter 7 concludes by assembling the thesis' main findings. It also reflects upon some caveats that are required as a result of the study's limitations, and points to two avenues for the extension of the analytical purchase of the analytical framework developed here. The conclusion also points to three major avenues for further research.

## **2 Electric territorialities of the African state: political strategies of peripheral electrification**

The Introduction argued in favour of paying attention to processes of electrification that are occurring across a limited yet growing number of peripheral regions of Africa. It claimed that due to the incontestable costs posed by uninviting geography, peripheral electrification almost invariably ensues from political calculations and that, in consequence, asking why and how African peripheries get electricity affords an excellent window to examine the wider question of how African states govern their peripheries, and what are the attendant political linkages between centre and periphery. Interrogations as such are building up a novel research agenda that asks itself, amongst other questions, about the territoriality and the uneven development of energy transitions (also in access) in sub-Saharan Africa (Baptista 2018). To contribute to this agenda, this chapter vindicates an innovative angle: core-periphery linkages. Trumping geographical barriers (ie distance, low density, limited income or poor resource endowments, as the case of northern Ghana will show), or aligning with exuberant geographical endowments (as southeastern Tanzania will illustrate), core-periphery political linkages underlie state projects of production of political-territorial arrangements. In connecting those linkages with sectoral policies in electrification, this chapter takes the claims of the Introduction to the analytical domain. It aims at building a working model that explains why and how the electrification of African peripheries proceeds. To that end, this chapter makes two claims. The first claim is that to explain policies and spatial patterns of access it is necessary to put together the territorial politics of the state and the sectoral policies in electricity. To that end, this chapter advances a taxonomy of core-periphery linkages that explain why and how state bureaucracies launch electrification schemes in peripheries. The second claim is that to understand peripheral electrification it is vital to consider the interactions between access and subsequent provision and to avoid

treating them as two separate policy domains, as the literature often does. It is common, for instance, that rural electrification and tariff-setting policies are considered independently. Both claims are substantiated in the analysis of the territorial strategies of the state in the electrification of peripheral regions. In line with Robert Sack's conception of territoriality as a strategy (Sack 1983, 1986), this chapter proposes the notion of "electric territorialities" to capture the differential condition of state strategies across sub-national territories.

The claim that peripheral electrification almost certainly follows political calculations needs not be taken as excluding political commitments to deliver public welfare. Rulers and bureaucrats may nurture a genuine desire to bring about development, and accordingly find electrification schemes in long-neglected peripheries a suitable conduit to that end. But at the same time it is inevitable to perceive self-interested political calculations or considerations of state interests in those cases of peripheral electrification in which the professed will to develop the region is hardly tangible in concrete, attendant investments in other policy domains.

The core analytical claim in this chapter is that heightened core-periphery political linkages (whether driven by state calculations or the result of state-society bargains) structure the patterns of electrification in peripheral regions. In this, the peripheral patterns of electrification observed diverge substantially from those encountered in core and semi-peripheral regions (even after the differentiating effects of disparate geographical factors between core, semi-peripheral and peripheral regions are taken into account). The causal mechanism is hypothesized as follows. Initially, as a result of either the calculations of state elites or the strategic bargains between state and authoritative sub-national constituencies, or both, core-periphery political linkages (e.g. electoral gains, legitimacy building, etc) escalate to a point where they can trump geographical factors constraining expansive sectoral policies – factors that are either negative, e.g. distance, lack of income, etc, or positive, ie resource endowments. Once in action, core-periphery political linkages act as a structuring influence upon the policy process that adjudicates interventions to increase access to electricity. In so doing, they combine with the structuring effect of the distributional settlement that is embedded in the national electricity regime. Together, the national electricity regime and the core-periphery linkages mould the territorial strategies to be implemented by state agencies, which ultimately translate into observable territorial

outcomes (patterns).<sup>4</sup> The crucial point here is that an element, ie core-periphery linkages, alien to the national electricity regime is able to have a direct influence over the latter even re-directing policies in the peripheries over a course that parts ways with analogous policies in core and semi-peripheral regions. It is in this sense that the observation of peripheral electrification helps to settle two questions: first, who gets electricity, when, and how; and second, what are the fresh political relations between centre and periphery that emerge in parallel to peripheral electrification.

As core-periphery linkages are concerned, this chapter adopts four drivers of sub-national electrification advanced by the political economy of electricity: a) electoral gains; b) legitimacy building for regimes and states; c) ambitious regional economic re-engineering; and d) elite bargains around demands from sub-national actors (eg around local infrastructural grievances). The proposition that narrow electoral gains compel rulers to use electricity to reward loyal districts, punish disaffected constituencies or convince swing voters has been put forth by Brian Min's *Power and the Vote* (2015) and Sunila Kale's *Electrifying India* (2014). Likewise, the case for building the legitimacy of regimes, or even states, through far-reaching works of electrification can be found in various case studies reviewing Ghana under Nkrumah (Miescher 2014), Sudan under Al Bashir (Verhoeven 2015), Ethiopia under the Ethiopian People's Revolutionary Democratic Front (Menga 2016) or Spain under Franco's dictatorship (Swyngedouw 2007). A quintessential instance of regional re-engineering via electrification is offered by Jonathan Coopersmith's *The Electrification of Russia* (1992). Altogether, the first three explanations noted so far stress the calculations entertained by state actors and, notably, rulers in the centre. By contrast, the fourth driver of core-periphery linkages, ie elite bargains around demands from sub-national actors, is considerably less state-centric. It stresses instead the strategic bargains between the central state and well-organized, mobilized sub-national elites with distinct interests in peripheral electrification, ie irrigation or industrial development. At the risk of oversimplifying, it can be said that state-centred accounts hold that state bureaucracies exercise their jurisdiction in keeping with their own volition or calculations, leaving limited latitude for the influence of societal actors. By contrast, bargain-centred explanations, while not denying the causal weight of the calculations of central elites, find strategic games with local elites more

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<sup>4</sup> This characterization of the policy process is partially inspired by Sabatier (2007).

plausible as an ultimate explanation. The distinction reminds of a classical fault line between contending theories of the state (Clark and Dear 1984; Migdal 2001; Miliband 1973; Mitchell 1991; Nordlinger 1981; Poulantzas 1980). As far as the authors referred above are concerned, Brian Min and Jonathan Coopersmith tend to give more weight to the impulse of the state, whereas Sunila Kale is a superb advocate of bargain-centred accounts. Obviously, both set of explanations are not necessarily at loggerheads, and their suitability may depend to large extent on the particular circumstances. In regions where sub-national elites are consistently side-lined, weak, or poorly integrated into the political system, the calculations of the centre may go a long way to explaining why electricity is provided in the first place. Likewise, in regions where sub-national constituencies are vigorous, and electricity has become politically salient locally, the ensuing strategic bargains may provide the key causal mechanism for the scope and pace of electrification. In that sense, one of the aims of this thesis is to go beyond bargains in electrification between central rulers and sub-national elites (*à la* Kale) and enrich bargain-centred explanations with interactions between state rulers and citizens in the peripheries. This will be explored in the Tanzanian case.

The chapter is structured as follows. The first section discusses the question of how contemporary African states strategise to govern their peripheral territories. This section draws on two key interrogations in the literature: how rulers in Africa have attempted to project their authority over space, and the difficulties that they have faced along; and how contemporary states produce uneven territorialities, in Africa and beyond. From them on, the second section looks specifically at the role of electrification in ruling over peripheries. It reviews the literature in search for insights about the structuring influence of core-periphery linkages over strategies and spatial patterns of electrification. In so doing, it offers explanations as to why and how states embark upon peripheral electrification. The taxonomy thus elaborated yields an array of likely drivers that may motivate rulers and state bureaucracies to embark upon the electrification of peripheries. Crucially, it also helps to identify how core-periphery linkages that govern the strategies of the political centre towards the peripheries emerge. The chapter concludes with a review of the virtues of the tentative model presented here.

### 2.1. How African states govern their peripheries

The mid-1990s inaugurated an era of renewed interest in the question of how African states project their authority over space. Part of the impulse came from a spatial turn in African Studies. Throughout the 1990s and 2000s, scholars from a very ample variety of fields in the social sciences have explored how space is utilised, reshaped and reordered; how it is produced and conceptualised; and how 'political space' is contested (Engel and Nugent 2010). One central contribution of this spatial turn has been the realisation that state territoriality not only results from the dynamics between the centre and the regions, but also from practices in the borderlands (Chalfin 2010; Nugent 2002; Nugent and Asiwaju 1996; Zeller 2010). Another major source of progress has been the re-interpretation of present political geographies in Africa under a historical light. John Markakis' (2011) vivid metaphor of the 'last two frontiers', the second one concerning the integration of Ethiopia's lowland periphery, is a masterly accomplishment. Intrigued by the persistence of uneven patterns in the projection of public authority within virtually every African country, scholars have started to interrogate systematically the underlying patterns of territorial politics in the past decades, even centuries, and the institutional responses by state rulers (Erk 2014). Explorations of this sort have broadly fallen under two categories. On the one hand, state-centric explanations have put forward state actors' desires, calculations and inclinations as the determinant force in the extension, or lack thereof, of state reach over space. Jeffrey Herbst's (2000) *States and Power in Africa* is the most eminent articulation of state-centric accounts. On the other hand, bargain-centred explanations have suggested that the adjudication of strategic bargains between the state and pivotal power-holding sections of sub-national elites goes a long way to explain variations in state authority within the same polities. This second argument has been exemplarily presented in Catherine Boone's (2003b) *Political Topographies of the African State*. The discrepancies between Herbst's and Boone's approaches are many, but they are particularly acute when applied to the question of how African states govern their peripheries. As the discussion below will show, Herbst's emphasis in the weight of atemporal geographical factors in the decisions of central rulers leaves little room for attempts to project state authority over African peripheral regions; whereas a more generous reading of the strategic motivations of central rulers presented by Boone seems to bear the promise of fresh answers to the limited weight of state authority in African peripheries.

Thus, for Jeffrey Herbst, African states have found it so difficult to extend their reach over space largely because of the difficulties that are inherent to projecting 'authority over inhospitable territories that contain relatively low densities of people' (Herbst 2000, 11). In his view, "constant" physical environments throughout pre-colonial, colonial and post-colonial times have hampered statebuilding strategies to the point of weakening state rule across large swathes of Africa. "Constant" geographies are in tune with the assumption that low population densities are but the virtually inescapable consequence of environmental conditions (Diamond 1997). But Herbst's perspective is also interesting because of his analysis of infrastructure, ie roads, as a conduit for the expansion of state authority over space. Indeed, roads lie at the crux of Jeffrey Herbst's take on state reach: 'when roads were finally built, they, more than railroads or waterways, brought the most profound changes to African society' (Herbst 2000, 84). Thus, Herbst cogently explains how in both late nineteenth century Ashanti and colonial West Africa the boundaries of state rule were basically defined by how far public authorities could reach in the manageable lapse of one or a few days. Inevitably, these left many areas beyond the grasp of the state. There is a convenient explanation for this, though. Thus, Herbst's (2000, 170) concludes that given the vast territories involved, state rules may prefer to leave some remote, peripheral areas largely to their own:

In fact, a not illogical strategy for many leaders confronting vast territories would be to try not to reach out to outlying areas and let those areas that want to threaten the state live in relative isolation, rather than face the choice of having to be governed by the center or seizing it themselves. Instead of spending money on road to secure their authority, African leaders, as chapter four suggests, have strong incentives to engage in patronage politics at the center.

Interestingly, Catherine Boone (2003, 37) concurs with Herbst that central rulers may feel disinclined to extend the grasp of the state to poorly endowed regions. In that case, scenarios of non-incorporations ensue, that is:

... a scenario wherein peasant society is neither threatening to the center nor, from the rulers' perspective, worth trying to exploit. The regime is not interested in incorporating the region into the national political space. Farmers are not engaged in much commercial agriculture, and surely not in the highly taxable activity of export-crop production. Zones occupied by nomadic groups

engaged mostly in subsistence activity would fit this description. French colonialists referred to areas like these as *Afrique inutile*. A strategy of non-incorporation is expected here: the regime will not build a deconcentrated institutional apparatus in this region and will, for the most part, leave local populations to govern themselves.

Or, similarly:

It seems reasonable to maintain, as a working hypothesis, that no state-builders would, in the absence of very strong societal pressure to do otherwise, opt to spread state capacity evenly across the national territory in the presence of geographically uneven distributions of population, economic activity, challenging topography, political support for the regime, and/or political resistance or opposition to the state or regime (Boone 2012, 637).

However, Boone's (2003, 2012) explanation for the non-incorporation of peripheries is only one aspect of a broader inquiry about the plausibility of purposefully territorial strategies of 'unevenness by design' by African states. Crucial to her inquiry is Boone's assumption that, in the absence of a political threat, and in line with an institutional choice approach (Geddes 1994; Levi 1989), the major motivation for the extension of state reach will presumably be taxation and the extraction of revenue. Equipped with this central assumption, Boone asks herself 'how do rulers choose strategies for governing the countryside, and when do strategies change' (2003b, 1). Her cogent answer is that in the decades after independence the appropriation of economic rents (in agriculture) triggered the administrative expansion into sub-national units. To account for the variation in strategies of administrative statebuilding, Boone postulates a matrix of four different institution-building strategies. These strategies are coterminous with the degree of stratification and hierarchy encountered by the state as it reaches out into sub-national units to capture revenue and extract taxes. The central message is that uneven statebuilding is the composite effect of deliberate choices by state elites and bureaucracies and the variegated degrees of friction opposed by social forces across the realm. In short, different strategic contexts account for the variation in the state's institution-building strategies. As far as peripheries are concerned, the core insight is that in the decades that followed independence, and possibly afterwards, African rulers renounced to integrate peripheries because they found little attraction in taxing poorly endowed regions. Discouraging as this may appear at first sight for the purpose of furthering the study of the projection of state authority over peripheries, Boone's framework somehow



still leaves the door open to incorporating additional motivations beyond revenue extraction into her bargain-centred approach, eg the search for narrow electoral rents or the response to sub-national demands (a point that Sunila Kale aptly demonstrates in the case of electrification, as discussed below).

One forceful reason to seek to expand Boone's argument further is that it squares well with what other Africanist scholars have argued. Amongst those arguments is Igor Kopytoff's idea that, historically, the weak territorial coherence of African polities stems from the feasibility of exit strategies vis-à-vis attempts to assert central authority against the backdrop of large stocks of unoccupied land (Kopytoff 1989). Boone's line of thought is also reminiscent of the cultural and moral barriers in state-citizens interactions that hindered state attempts to capture peasants (Hydén 1980). Lastly, and from a perspective more attuned to Boone's attention to inter-elite interactions, her postulates also strike a chord with Paul Nugent's (2010) framing of territorial social contracts between African states and regional elites, which emphasises the pervasiveness of permissive and extractive social contracts vis-à-vis productive ones.

Additionally, all these contributions, including Herbst's, afford powerful reasons to avoid the teleology involved in representing state-building as a process of ever-increasing territorial integration. Indeed, the difficulties in building effective state machines to project authority over space ought not to be taken as an exclusive feature of African states. Even the process of territorial integration in Western Europe, although often portrayed as the quintessential model, was hardly coherent. In the words of Stefano Bartolini (2004, 20):

The European nation-state building was not exclusively – as it is often thought – a process of integration and of unification of disparate and different territories, economies, and societies. It also implied the disintegration or simply the division of previously existing and integrated territories, economies, and societies.

Bartolini's words should also be read as a cautionary note against the diffusionist views on national integration that were prevalent in the post-WWII period (Finer 1970; Hartshorne 1950; Shils 1961; Whittlesey 1944). In a nutshell, diffusionist theories argue that states form through accretion around a core, often portrayed as the bearer of enhanced economic organisation or superior cultural values. Later transaction-based (Deutsch 1979; Edward W.

Soja 1974; Soja 1971) as well as bargain-centred and processual views (te Brake 1998; Flora, Kuhnle, and Urwin 1999; Tarrow 1977, 2004) eventually dethroned the diffusionist paradigm, although it has proven surprisingly resistant (Keating 2008).

The bargain-centred contributions referred above also help to dispel the idea that all states invariably aspire to extend their reach across the whole national territory. However, this notion is proving more difficult to dislodge. The bulk of scholarship on the infrastructural power of the state is a case in point, even though the original proponent of the concept can hardly be blamed (Mann 1984, 1986b). Building upon the experience of Western Europe in late 19<sup>th</sup> and early 20<sup>th</sup> century, the often unexamined assumption is that the expansion of state reach, and the attendant expansion of the national market, invariably homogenise sociocultural and socio-political patterns across the realm (Jones, Jones, and Woods 2004; Scott 1988; Taylor and Flint 2000). The oft-repeated source of inspiration is Eugen Weber's (1976) claim that as public education and railways rolled out across late 19<sup>th</sup> century rural France cultural and socio-political patterns across the polity also became homogeneous. The homogenisation argument may hold water in the late 19<sup>th</sup> and early 20<sup>th</sup> century period, in which Western Europe invested considerable energies in building both national polities and integrated national markets (Mann 1993). But it may be less exact to characterize as such state projects under the present neoliberal paradigm. Under neoliberalism, uneven spatial development does not necessarily follow market failure but is, perhaps, intrinsic or even desirable (Harvey 2006; Massey and Allen 1984; Smith 1984). For infrastructure, Harbers (2014) has shown some evidence in that direction by analysing night-time lights in Ecuador. More broadly, various authors have developed measurements of disparate state capacity across national space (Luna and Soifer 2017; Hillel D. Soifer 2008, 2012; Hillel D. Soifer and vom Hau 2008; Hillel David Soifer 2016). Their findings invite to adopt a more circumspect view on the homogenizing effect of expanding state reach.

Finally, bargain-centred approaches to the territorial authority of the state also resonate with representations of the African state far from the exclusive legitimate source of binding authority. Within Africanist scholarship, the political turbulence of the 1990s and early 2000s pushed some to postulate how extensively 'state spaces' in Africa are contested (Dunn 2008). Christian Lund has shown how public authority is not exercised exclusively by the state, but 'becomes the amalgamated result of the exercise of power by a variety of local institutions and the imposition of external institutions, conjugated with the idea of a state' (Lund 2006,

686). Others have also vindicated the authority-binding agency of multiple actors beyond, below, above and besides the state (Bellagamba and Klute 2008; Engel and Olsen 2005; Hönke 2010; Peiffer and Englebert 2012). To account for this reality, various labels have been coined: 'hybrid states' (Bogaards and Elischer 2016; Levitsky and Way 2010), 'twilight institutions' (Lund 2006), 'developmental patrimonialism' (Kelsall and Booth 2010) or negotiated statehood (Doornbos 2010; Hagmann and Péclard 2011) are particularly illuminating. Although extremely diverse and originating from different fields and incommensurable epistemologies, these representations of the state square well with a research agenda at the intersection of Political Studies and Political Geography which puts state-society interactions at the centre of its inquiries (Migdal 1988, 2001; Migdal, Kohli, and Shue 1994).

State-society relations also impinge upon territorial regimes. It follows from the above discussion on bargain-centred explanation of state territorial authority that central rulers, confronted with regional elites and citizens, find a necessity to strategise in how they project their authority. This idea underlies the very notion of territoriality. In fact, territoriality is conceptualised as a spatial strategy to 'affect, influence or control people, phenomena, and relationships by delimiting and asserting control over a geographical area' (Sack 1986, 19). For this definition, Robert Sack found inspiration in Gottmann (1973), who had earlier highlighted how territory can be mobilized for the economic organization of space. He also concurred with mainstream views of territory as '*bounded* and in some respects *homogeneous* portion of geographical space' (Painter 2010, 1091; emphasis in the original), as well as with novel formulations of the territorial organisation of the state as the key advantage over alternative authority-wielding institutional forms (Mann 1986b, 1986a). In terms of legacy, Sack's book inaugurated what would soon become a dominant tradition of functionalist approaches to territory and territoriality. In these perspectives, territoriality is solidly understood as a rather static attribute of the state (Antonsich 2017; Dahlman 2009). Over time, and mirroring the debates referred above, static and state-centric perspectives have given way to more nuanced understandings of territory and territoriality which stress how territories are conformed by social relations (Lefebvre 1991; Painter 2010; Raffestin 1984). From this perspective, national and sub-national territorialities emerge as a result of the strategies of different actors and their relationships (Murphy 2012, 2013). It is this

perspective that informs the exploration of the links between electricity and the production of territoriality and territorial regimes that follows.

## **2.2. Electricity and territoriality: core-periphery linkages**

By providing electricity to unserved regions, governments aspire to deliver development as well. The stated benefits of electrification are extensive. According to a non-exhaustive review of the literature on rural electrification, it includes the following: economic growth due to increased economic activity and enhanced productivity, increased education, redress of gender imbalances, reduction in the incidence of health problems, better communications and extended access to information (Brew-Hammond and Kemausuor 2009; Lockwood and Pueyo 2013; World Bank 2008). Yet there may be more than the mere pursuit of development behind schemes of electrification. In that sense, the political economy of electrification has pointed to four major drivers of regional programmes, namely: electoral gains, legitimacy building for regimes and states, ambitious regional re-engineering, and strategic bargains with sub-national elites. This section reviews the political drivers that structure strategies of access in sub-national electrification.

The political effects of electric infrastructure on state reach have been underlined by a range of disciplines: history (Alatout and Schelly 2010; Chikowero 2007; Coopersmith 1992; Duffy 2011; Molle, Mollinga, and Wester 2009; Thomas 2011; Wilks 1992), electoral geography (Briggs 2012), political economy (Debie 2010; Njoh 2008), urbanism (S. Graham and Marvin 2001), anthropology (Kernaghan 2012; Larkin 2008, 2013; Shiel 1984; Wilhite 2005; Winther 2010), political geography (Swyngedouw 2007), and science and technology studies (Bouzarovski, Bradshaw, and Wochnik 2015; T. P. Hughes 1993). Electrification, like roads, railroads, schools or the postal service, has also been singled out as a conduit for state power (S. Graham and Marvin 2001; T. P. Hughes 1993; van der Vleuten and Kaijser 2006; E. Weber 1976), as the two following comments with reference to Africa aptly capture.

In the end, the power grids of today are akin to the railway lines of colonial Africa, lacing the continent with ribbons of steel that have little connection to the social, economic or demographic needs of its people. But instead of being driven solely, or even largely, by European capital, this particular “scramble” for

African resources is being determined by the South African state and South African capital (McDonald 2009b, 37).

In the new Zambia, electricity (like those other primary goods of modern life, education and health care) would link all of the country's citizens in a universal, national grid of modernity (Ferguson 1999, 242).

Before exploring the territorial implications of electrification for state authority, however, it is necessary to dispel some commonly-held notions about the determinant influence of geographical and environmental factors. The next two sections contrast explanations of (non-)peripheral electrification premised on the idea of geographical determinism and alternative formulations based on strategic political bargains between states and key societal actors.

### **2.2.1. Geographical determinism and peripheral electrification, or the lack thereof**

Trying to explain the lack of electrification in African peripheries, the dominant view in the literature has fallen in a sort of 'spatial fetishism,' that reifies distance and demography as causal factors in themselves. Indeed, extending electric grids to remote regions is challenging and costly (Doll and Pachauri 2010; World Bank 2013b; Zomers 2001). Often overwhelmingly rural, remote regions in Africa are characteristically defined by scattered settlements, low population densities, sinuous topographies and poor effective demand. The challenges are operational but also social and political. Barnes offers a synthetic description:

Rural electrification programmes undoubtedly face major obstacles (World Bank 1975, 1996). Low populations densities in rural areas result in high capital and operating costs for electricity companies (Denton 1979; Fluitman 1983). Consumers are often poor and their electricity consumption low. Politicians interfere with the orderly planning and running of programs, insisting on favoured constituents being connected first and preventing the disconnection of people not paying their bills. Local communities and individual farmers may cause difficulties over rights of way for the construction and maintenance of electricity lines (Barnes 2007b, 1).

Bridging hundreds of kilometres from the grid to rural settlements may prove onerous for public administrations commonly marred by narrow domestic revenue streams, sizeable public deficits, and the distrust of international financial markets. Deploying pylons over

rugged terrains, sometimes along routes at a certain distance from roads, or accessible only seasonably may be technically challenging. Characteristically, the end of a long electric line serving a village in a peripheral region is plagued by voltage below technical standards caused by losses in transmission, only serves about one third of the households, and connects one church or mosque, the primary school, and the refrigerators of a handful of kiosks and bars. Poor settlements with low density stymie the possibilities of attaining the economies of scale to recover the large upfront investments typical of centralized distribution systems. Barnes, again, synthesizes the (non-)economies of rural electrification:

Rural areas are characterized by low population density with a significant number of households that are poor. This density results in low levels of household demand for electricity, which generally is concentrated at evening peak times. The low population densities mean that electricity distribution costs must be spread over relatively few people, resulting in high costs for each unit of electricity consumed. Demand normally matures slowly (over two to three years and even longer) as consumers wire their houses, invest in appliances, and make the switch from other fuels for lighting and cooking. As the demand grows, the cost per customer for rural electrification declines. Unfortunately, this progression is difficult to predict, making returns to investment in grid extension to poor rural people uncertain (Barnes 2007b, 11).

It is comprehensible that electric utilities are wary of bringing electricity to remote, sparsely populated areas. There are even more difficulties in peripheral regions. Peripheral regions are often deprived of cash crops, vibrant trade and exploitable resource endowments. Utilities (or tariff regulators) find it impossible to recover their investments and operational costs by means of cost-reflective tariffs for commercial and industrial customers, and cross-subsidies from the former to poor residential customers. Most often, bringing electricity to poor households in peripheral regions is feasible only with extensive subsidies from the central state (Kojima, Bacon, and Trimble 2014). All in all, distance, demographics and (lack of) endowments are often presented as the most serious barriers to access to electricity across Africa (Ahlborg and Hammar 2014; Brew-Hammond 2010; Szabó et al. 2013; Zvoleff et al. 2009). In its most extreme version, geographical determinism is said to explain the paucity of peripheral electrification as well as to establish its contours, when carried out.

But even though relevant and useful, explanations that draw exclusively on geographical determinism suffer from two major shortcomings. Undeniable as the effect of geography is,

the notion that space in itself causes social outcomes should be rejected (Duncan 1989). First, deterministic theories explain why African governments have of late (if only occasionally) embarked upon programmes of electrification in their regional peripheries. If the barriers posed by geography and demography are insurmountable, why then have African governments undertaken peripheral schemes of electrification over sustained periods of time? The schemes to electrify northern Ghana and southeastern Tanzania are cases in point; but there exist others, such as Senegal (Mawhood and Gross 2014) and South Africa (Bekker et al. 2008; Gaunt 2005). Second, deterministic explanations are largely underdetermining (ironically enough). Once schemes to electrify peripheries or semi-peripheries are in place, geographical determinism per se is at pains to account for the variations in the trajectories and strategies of electrification implemented. Deterministic explanations alone fail to explain why patterns of electrification in peripheries and non-peripheries are incongruent. Yet parting ways with geographical determinism, other explanations of sub-national electrification have turned towards political factors. The next section explores four core drivers that underpin the electrification of regional peripheries.

### **2.2.2. Core-periphery linkages in electrification**

In trying to explain why governments may embark upon the electrification of remote and often poorly endowed peripheries, the literature has identified four core drivers or, drawing inspiration from the literature on politicians-citizens linkages (Kitschelt and Wilkinson 2007), core-periphery linkages. These four core-periphery linkages are: a) the search for narrow electoral gains; b) legitimacy building for regimes and states; c) regional economic re-engineering; and d) elite bargains around demands from sub-national actors (eg local infrastructural grievances).

Min (2015; 2017), Brown and Mubarak (2009) and Trotter (2016) have pointed to the search for narrow electoral gains as a motivation that may induce incumbents to electrify whole regions, including peripheries. First, electrification addresses citizens' concerns about poor infrastructure. A recent survey finds that in half the African countries infrastructure in general is only second to job income in a list of citizens' concerns. Electricity is the first infrastructure-related concern only in Cape Verde, Nigeria and Senegal, but it continues to be relevant even beyond those countries (Leo, Morello, and Ramachandran 2015). Crucially, access to

electricity can gain considerable salience at the sub-national level. This holds particularly true for peripheral, long-neglected territories, and even more for regions where electricity has been put on the public agenda by authorities themselves - as in Northern Ghana since the late 1980s (Briggs 2012). Second, electrification schemes lend themselves to fine-tuning to reach desired areas, allowing rulers to maximize their yields in rewarding, enticing or punishing, respectively, core, swing or disaffected voters. Inchoate quantitative evidence suggests that, over the last two decades, African incumbents may have been strategically mobilizing access to electricity to attract swing votes (Trotter 2016). This finding is said to extend to disputed districts in single-party regimes, as half-convincingly claimed for Tanzania (Rosenzweig 2015).<sup>5</sup> Third, the routine operation of electricity invites discretionary delivery, as authorities may switch supply on and off, as the politics of load shedding and blackouts illustrate. This offers a major advantage: authorities may reward or punish citizens and continue to accrue their votes even after the infrastructure has been delivered: 'politicians can seek political advantage in two stages: first by negotiating where infrastructure projects are built, and second by managing the ongoing flow of services' (Min 2015, 47). Electricity offers a vital advantage over another exceptional popular vote-catcher: roads. All in all, incumbents seeking re-election may find the prospect of providing access to electricity in selected territories very compelling: 'elections generate political incentives that privilege the *delivery* of public goods projects, more so than improving the *quality* of such projects' (Min 2015, 9; italics in original). Processes of electrification are not neutral, they are loaded with social and political overtones (Brown and Mobarak 2009; Kale 2014). The chain linking democracy, responsive institutions and increased electric consumption per capita is but one trajectory (Ahlborg et al. 2015). In other cases, geographically-selective electrification is part and parcel of schemes of rural electrification for less commendable motivations.

In addition, implementing a policy of electrification is mediated by state-owned or private utilities that operate over geographically-bounded demarcations – a key insight in

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<sup>5</sup> The results of the regressions that underpin the findings of both studies must be taken with more than a pinch of salt, though. Firstly, in the African countries considered for Trotter's study, as well as for Tanzania, increases in access to electricity, albeit noticeable in relative terms, often remain below ten points in absolute terms. Therefore, variations in the dependent variable are comparable to the order of magnitude of the error margins that often plague African statistical systems (Jerven 2013). Secondly, Rosenzweig's model indicates that statistically relevant differences in investments in the range of the few dozens of thousands of dollars influence voting patterns. This claim does not square well with the relatively stronger political leverage attributable to concomitant, higher budgets allocated to alternative sectors in Tanzania's districts.



sustainability transitions (Coutard and Rutherford 2010; Monstadt 2007). As we are reminded by Brian Min: ‘within the gap between policy goals and policy implementation lie lucrative political externalities that are contested, exploited, and captured by political actors, driven not only by policy goals but also by their own political incentives’ (2015, 7). Utilities, particularly private ones, nurture their own distinct strategies (Criqui and Zérah 2015). Also, they are employed by incumbents to put in circulation biases in favour of key constituencies, sometimes geographically concentrated, or simply to provide a conduit for the provision of public goods beyond its strict mandate (Foley and Logarta Jr. 2007). They do so by means of cross-subsidies (Brown and Mobarak 2009; Nygaard and Dafrallah 2016) and other infrastructural investments that are often skewed toward a rural bias (Boone and Wahman 2015; Harding 2010). Moreover, power companies also carry out political choices between supplying industries or households, particularly acute when electricity is scarce. Utilities are cajoled into translating persistent preferences of democratic leaders to supply electricity to the rural poor, especially in polities where the latter are large in numbers and receive dismal services (Brown and Mobarak 2009; Min 2015). Lastly, power utilities also provide a convenient conduit for electoral gains. In South Africa, core African National Congress-voting constituencies were disproportionately targeted by municipal utilities (V. Kroth, Larcinese, and Wehner 2016). Power companies, especially state-owned ones, play a major role in electoral politics.

Electrification shows two distinct advantages over other forms of infrastructure, such as roads, to explore electoral politics. First, roads are a club good, and thus not targeted (Bates 1983; Drazen and Eslava 2010; Lindberg 2010); and second, patronising roads does not involve routine state—citizens direct interactions except at checkpoints or weigh stations. That is not the case with electricity provision. Although electric poles for the electrification of a particular area can reasonably be understood as club goods (Lindberg 2010), it is also true that at one end of an electric line the wires always reach a particular household. Electric lines offer a distinct advantage for a fine-grained and more penetrative reach of public authority (Briggs 2012; Min 2015). Moreover, routine consumption of electricity necessarily involves interactions with public authorities, mostly for payment, but also in the event of faults and blackouts. Therefore, electricity provision is able to better capture state-society interactions as a constitutive exercise of state capacities. In line with this, some indicators of

state fragility and strength have incorporated the dimension of energy consumption (Fabra Mata and Ziaja 2009).

Pertinent as electoral motivations are, there exist other drivers of peripheral, large-scale electrification. A second driver are attempts to legitimize specific regimes or state projects. This is tangible along major projects of national and rural electrification throughout the 20<sup>th</sup> and early 21<sup>st</sup> century: pre-war growth and post-war reconstruction in Britain (Luckin 1990); social development in Ireland (Shiel 1984); hydro-power on a massive scale in Spain (Bartolomé and Lanciotti 2015; Swyngedouw 2007); state-building in Palestine (Meiton 2015, 2016; Shamir 2013); sustained rural electrification in Tunisia (Cecelski et al. 2007); redress of apartheid in South Africa (Bekker et al. 2008); electricity to the north in Ghana (Eshun and Amoako-Tuffour 2016); electric “renaissance” in Ethiopia (Cuesta-Fernandez 2015); and, last but not least, the decades-long efforts at electrification in China (Lockwood 2015; W. Peng and Pan 2006; Yao and Barnes 2007). State legitimization attempts often articulate two synergic variables: on the one hand, the entanglement between developmentalism and high-modernism; on the other hand, ideals of social justice and the desirability of transforming societies through forceful state intervention. Accordingly, for a good deal of the 20<sup>th</sup> century the state was widely perceived as entrusted with a double mandate: to promote access to electricity as widely as possible, and to pursue industrialization hand in hand with rural electrification as the foundation for solid and just economic growth. The early Soviet Union is a case in point (Coopersmith 1992); another is the United States (U.S.) before and under Roosevelt (Brigham 1998; Glaser 2009; Mock 2014; Nye 1998; Tobey 1996; Wolman 2007). At the time, socialism and the New Deal, respectively, provided the ideological thrust required by regional and rural electrification to achieve universal access. In its most extreme version — Russia in 1920-26 — electrification ‘became the connecting point between planning for rational economic development and large-scale remolding of the social and industrial landscape’ (Coopersmith 1992, 150). Yet top-down efforts in the United States were no less impressive. In the mid-1930s some 10% of farms in the United States were electrified; however, by the early 1950s the Tennessee Valley Authority (TVA) and the Rural Electrification Administration had succeeded in connecting to centrally-operated distribution grids more than 90% of farms (Alatout and Schelly 2010). Part of the success drew on the TVA’s clever combination, certainly in discourse but also partially in practice, of technology, scientific management and planning with inclusive, grassroots democratic participation

(Ekbladh 2002; Lilienthal 1944; Wolman 2007). The success of the TVA was so apparent that it provided the institutional mould for electrification-cum-modernization worldwide (Molle, Mollinga, and Wester 2009). Rural electrification throughout the US, it is argued from radical quarters, indeed functioned as a technology of government helping to enrol rural communities in the political economy of the state. As such, the New Deal mobilized rural electrification as an attempt to stabilize the state and to complete government through novel articulations of the population-territory nexus (Alatout and Schelly 2010). Africa was also administered more than a fair share of dam-building along the lines of the TVA model (Showers 2011). TVA's epitome, the Hoover Dam, in concurrence with the evangelist zeal of the World Bank and subsequent United States administrations until the mid-1970s (Ekbladh 2002), inspired analogue schemes in Tanzania (Hoag 2006; Öhman 2007; van der Straeten 2014), Mozambique (A. F. Isaacman and Isaacman 2015), Ethiopia (Clapham 2006), and Ghana (Edjekumhene and Dubash 2002; Miescher 2014).

More prosaically, implementers of high modernism via regional electrification adopted more matter-of-fact choices. In 1920, the State Commission for the Electrification of Russia (GOELRO), was confronted with one of such choices.

Yet the focus on regional stations was not inevitable, nor was the ascent to state technology without complications. Electrical engineers had a choice of three technological paths for post-civil war electrification: a centralized path of building regional stations, a conservative path of expanding existing utilities, and a radical path of rapidly electrifying the countryside (Coopersmith 1992, 152).

In prioritising the first alternative, Soviet policymakers opted for tapping into existing or induced industrial demand in the more developed centres as the basis for national electrification; rural (ie agricultural) electrification through small local stations did not occur until the New Economic Policy in the mid-1920s. In the US, the dilemmas were of a different nature. The New Deal administration was confronted with large pockets of rural under-consuming populations, singularly in the South. Diverse strategies were implemented, from low rates for rural areas to the promotion of upscale appliances such as refrigerators and ranges. In the end, rural electrification was largely fuelled by low rates made possible by big dams such as those built by the TVA. Efforts by the Electric Home and Farm Authority to mainstream 'sales of refrigerators and other goods . . . to forge a political economy of mass

consumption,’ inspired by what Henry Ford had achieved with his model T, only partially delivered on its promises (Field 1990, 33).

The third major motivation for electric scrambles is given by projects of spatial development conceived to re-engineer and “open up” whole regions. Such projects are often associated with major extractive and industrial schemes and landlocked regions are a primal target. Ultimately, the desire to open them up is meant to accrue increased resource extraction for the state (often also to political elites). That electrification is often premised as the triggering factor for economic take-off of backward regions is hardly a novelty. In the early 20<sup>th</sup> century, communist planners envisaged that ‘electrification and the concomitant industrialization would lift entire areas into the economy and culture of modern Russia’ (Coopersmith 1992, 171). Analogue presuppositions are recognizable, *mutatis mutandis*, in more recent narratives of hydropower and irrigation development in Africa: the Ethiopian Omo River (Abbink 2012; Mains 2012; Verhoeven 2013), Sudan’s ‘Agricultural Revival’ (Mohamud and Verhoeven 2016), or South Africa’s Orange River Project (Turton 2003). In all of them, it is easy to recognize reinvigorated ideals of territorial modernization as part and parcel of dam building schemes (cf. Dye 2016). There were industrial counterparts to this agricultural development. One example is the ‘African Ruhr Valley’ envisioned in the Belgian Bas Congo region in the 1950s. The project never saw the light, but 1982 witnessed the inauguration of the world’s longest high voltage direct current link (Gottschalk 2016; Showers 2009).<sup>6</sup> Another example was Zambia’s Copperbelt: ‘The electrification of the townships was a compelling symbol of inclusion, a sign that Africans, too, were to be hooked up with the “new world society”’ (Ferguson 1999, 242).

All explanations based on the three drivers commented above are state-centric. They make state actors’ desires, calculations and inclinations the primal causal mechanism of regional electrification. State-centred explanations therefore suggest that to understand the politics of electrification one must only look at how presidents, ministries and bureaucracies plan and implement schemes of electrification. But other analysts have questioned this logic. They have accordingly started to interrogate instead the strategic bargains between the state and key (often sub-national) groups of actors with political clout in the regions to be electrified. Sunila Kale’s *Electrifying India* (2014) is a magnificent example of fourth, bargain-centred

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<sup>6</sup> Although the direct current line ran in the opposite direction, linking Inga and Kolwezi (Katanga).

explanation that accounts for variations in sub-national electrification. Her study shows how political strategies can overcome the barriers posed by geographical determinism if central elites anticipate at least a modicum of political gains. Perhaps more importantly, *Electrifying India* examines the role of sub-national elites in attracting electricity for their regions. Halfway between political economy and political geography, the book sets out to test to what extent the social and political order in three provinces between the 1960s and 1980s shaped how electrification was deployed. One chief argument is that electrification in the regions of Odisha, Maharashtra and Andhra Pradesh was determined by the strategic bargains between national and provincial authorities, on the one hand, and local agrarian elites, on the other:

Rural electrification occurred either when rural constituencies became politically influential in state governments or when farmers mobilized to demand a larger share of development resources. The initial conduit of electricity into rural India was for its productive impact in agroindustries and for irrigation; household access followed (Kale 2014, 4).

In Maharashtra a strongly politicized agrarian elite of 'sugar barons' successfully extracted major investments in rural electrification from state and national administrators. In Odisha, strong industrial interests had the opposite effect, to the detriment of access to electricity in rural areas of the state. Lastly, in Andhra Pradesh the contested political scene of the 1970s and 1980s raised the salience of the cost and availability of electricity in the villages. In that context, the active mobilization of farmers shifted development priorities toward generous policies of electrification in the countryside. All in all, in Kale's model the strategic interactions between national and sub-national rulers and agrarian and industrial interests cogently accounts for the unevenness in electrification outcomes over the decades. As hinted above, the value of Sunila Kale's work resides in extending Catherine Boone's emphasis on taxation to incorporate additional political motivations; and on inscribing those motivations into Boone's model of strategic bargains pitting national against sub-national elites.

### **2.3. Electricity and sectoral policies: Distributional settlements**

The previous section expounded on the role of a limited set of core-periphery linkages in shaping spatial patterns of access to electricity. However, as advanced above, core-periphery linkages cannot explain *per se* the outcomes in access that are typically reflected in

electrification rates. Accordingly, this section explores the influence of sectoral policies set at the national level in the patterns of access and provision of electricity prevalent in the sub-national, ie regional, scale. To that end, the account below introduces two concepts: the national electricity regime, as the set of overarching institutional, material and discursive predicaments that persist over long periods of time, often within the range of a few decades; and the distributional settlement, as the crystallisation of the adjudication of a core set of distributional issues between various actors (state agents, regulators, industrial interests, urban and rural constituencies, donor agencies, transnational companies, etc.).

To analyse the influence of national sectoral policies on regional units, the starting point is the realisation that the electrification of sub-national units occurs against a backdrop of national energy policies. Indeed, and except in relatively episodic transitions, electric utilities supply power in keeping with patterns that remain rigidly structured and fairly stable over time, according to formal and informal rules embedded in 'national electricity regimes' (Thue 1995; van der Vleuten and Raven 2006). That stability has attracted the attention of numerous schools of thought. Historical Institutionalism has highlighted the role of electoral and political institutions, regulatory agencies, credible political commitments to policies, power and incumbency, institutional systems, sources of regime stability and instability, policy feedback effects, and types of gradual institutional change (Lockwood et al. 2016). Sociological Institutionalism has, in turn, elaborated on how sets of actors vie for advantage in positions and resources through an embryonic theory of strategic action fields in energy systems (Fligstein and McAdam 2011; Goldstone and Useem 2012; Kungl 2015; Schmid, Knopf, and Pechan 2016). A sociology of practice has pointed to the reproduction of social practice and complexes as a chief factor ensuring the continuation of extant regimes (Shove and Walker 2014). Critical Geography has emphasized the close connections between energy, geography and other societal processes, such as urbanization, geopolitics, consumption or globalization (Huber 2015). Lastly, Science and Technology Studies have articulated a theory of infrastructure resilience and change around path dependency, the permanence of technical artefacts, phases of evolution, and the processes underpinning change, ie ecological modernisation, privatisation, liberalisation and commercialisation, and technical innovations (Monstadt and Naumann 2005). Some studies have examined how institutions, infrastructure and discursive strategies may account for both stability and change (van der Vleuten and Högselius 2012). From this latter angle, the study of Large

Technical Systems coined the term 'national regime of electricity' (Thue 1995; van der Vleuten and Raven 2006). National electricity supply regimes comprise

Constellations of several interlocking components that give regimes their temporal stability: (1) on the material level, the dominant design(s) of electricity supply systems; (2) the actors that own and operate these systems, their organizations, and their perceptions and expectations; and (3) the institutional rules, mainly in terms of organizational and regulatory frameworks defining the relationships between actors (van der Vleuten and Raven 2006, 3740–41).

According to this tripartite understanding of national electricity regimes, the prevalent distributional settlement under a particular regime fits within the third component, ie the institutional rules (both formal and informal) that establish the relations between societal actors (policymakers, regulators, household and commercial customers, large industrial interests, donor agencies, transnational private companies, etc.).

Although promising, the idea of national regimes of electricity has so far made little headway with scholars (Raven 2004; Verbong and Geels 2007). At the same time, an underlying notion of national regimes is a foundational, if non-explicit, premise of many works that set out to scrutinize electric sectors from a systemic perspective. Very often, scholars adopt the nation-state as their unit of analysis, and accordingly interrogate the constitutive traits of national regimes. It is worth reminding however that, despite their inertia, national energy regimes can also change in the mid- to long-term. The literature has pointed out how climate change and technological breakthroughs such as renewable technology are pushing electricity regimes to transition from one configuration to another (Lagendijk 2008; van der Vleuten and Högselius 2012; van der Vleuten and Kaijser 2006). Moreover, the approach that dominates the analytical agenda on sociotechnical transitions, ie the Multi-Level Perspective, has put regimes right at the centre of its model. This perspective is propelling the rapid expansion of research that examines to what extent shocks to regimes, in conjunction with the challenges that the latter face from emerging niches, may explain transitions in sociotechnical regimes (Araújo 2014; Foxon 2011; Frank W. Geels 2014; Frank W. Geels et al. 2016; Verbong and Geels 2007, 2010).

Many studies have established connections between the stability of national electricity regimes and the reproduction of unevenness. Again, the literature on energy transitions and,

more broadly, on Large Technical Systems has put forth some general mechanisms that account for how national electricity regimes produce unevenness, but also for how unequal regimes are contested. One major source of inequality between sections of citizens is energy poverty (Bouzarovski and Petrova 2015), or, as it is known in Europe, fuel poverty (Boardman 1991; Thomson and Snell 2013). Disparities in access to energy are reproduced not only by factors imputable to the household but also to the energy system (Bouzarovski and Tirado Herrero 2015; S. M. Hall, Hards, and Bulkeley 2013). Another paramount source of unevenness is the entrenchment of powerful actors within the regime. Powerful incumbents, particularly those bound to fossil fuel regimes, defend their positions through instrumental, discursive, material and institutional forms of power and resistance (Frank W. Geels 2014). To do so they employ various means, including building up political coalitions of incumbents (Hess 2014; Markard, Suter, and Ingold 2016; Szarka 2010). They also mobilize discursive and business strategies that re-position incumbents from opponents to supporters of sustainability transitions (Hermwille 2016; Kungl 2015; Sühlsen and Hisschemöller 2014). Lastly, unevenness is similarly maintained or challenged through infrastructural layouts and institutional configurations that, alongside discursive positions, structure the dynamics of change and stability in Large Technical Systems (van der Vleuten and Högselius 2012).

These findings resonate with the overwhelming evidence about the entrenched unevenness of African national electric regimes. Unequal access to electricity and subsidies captured by the well-off constitute a major source of unevenness in African national electric regimes (Dubash 2002; Eberhard et al. 2008; Khennas 2012). In 2012, 35% of African households enjoyed access to electricity (69% urban; 15% rural), compared to 79% in South Asia, the region with the second lowest access rate (World Bank and IEA 2015). Huge disparities can be found between 'community access' and 'household access.' In Cape Verde in 2012, for instance, 72% of the poor lived in communities connected to the grid, but only 34% of them were indeed connected (Komives et al. 2005). Discrepancies in access between urban and rural areas of Africa range from 93/48% in Nigeria, 89/47% in Ghana, and 52/9% in Tanzania. However, when only the low-income households are considered, the gap grows to 88/38, 74/32 in Nigeria and Ghana, respectively, and falls to 7/4 in Tanzania (Kojima et al. 2016). The distributive disparities in African electric regimes affect provision as well as access. To a large extent, the subsidies embedded in the tariffs remain captured by well-off urban customers and, to a lesser extent, by vested industrial interests. Taking a sample of 16



countries, the World Bank found that residential customers account for 42% of the deficit in the power sector, whilst they are only 38% of total customers, which suggests a modest cross-subsidy from other categories of users (Trimble et al. 2016). In Tanzania, the poorest 20% of households consumed in the early 2000s only 6% of total demand. The richest quintile received, by far, the largest share of the (implicit) subsidy, with 54% (Hoogeveen 2007). Also in Tanzania, the overall direction of cross-subsidies has been found to flow from general to lifeline customers, but also from general to industrial users supplied in high voltage (D. Peng and Poudineh 2016). Households in the richest quintile of nine African countries spent approximately 20 times more on fuel and electricity than the lowest quintile. On average, households in the upper quintile capture about 45% of fuel subsidies, whilst the bottom 40% receives only about 20% (Alleyne 2013). In Ethiopia, subsidies in the late 1990s covered 46% of the long-run marginal cost of electricity. With well-off households widely overrepresented in the customer base, the generous subsidy largely benefitted the richest urban segments (Kebede 2006). Quasi-fiscal deficits, ie the difference between the net revenue of an efficient utility and the net cash it collects, are 2.2% and 1.7% in Madagascar and Ethiopia, respectively. Ghana (Electricity Company of Ghana (ECG)) and Tanzania (TANESCO) accrue quasi-fiscal deficits of 0.5% and 0.3%, respectively, in the lower band of the continent (Kojima and Trimble 2016). Tariffs are less progressive than formal tariff structures would suggest as the burden of fixed charges is felt disproportionately by households with less income (Briceño-Garmendia and Shkaratan 2011). In addition, connection costs pose a higher barrier to low-income households than to better-off customers (Kojima et al. 2016).

But even though the empirical evidence on inequality on African national electric regimes is overwhelming, the mechanisms of how it is reproduced are less clear. African national electric regimes are cut by deep-seated distributional conflicts. Powerful incumbents seemingly exert a considerable influence over policy outcomes. Political interference is the oft-cited root cause. Hence, Tangri (1991, 1999) sets out to explain timid changes in national utilities in the 1990s as the outcome of both political interference and the risks feared by political bigwigs to entrenched networks of patronage. Cooksey (2002), in turn, reveals how little change happens that is not accepted by the ruling coalition, and lays out a scathing critique of the mendacious connections between Tanzanian political elites, the highest echelons of bureaucracy, and unscrupulous businessmen. Gray (2015) insists on the persistence of corruption as an indicator of policy continuity over time. Her findings are

reinforced by the underlying similarities in industrial policies across decades (H. Gray 2013). National ruling coalitions sustain deep-entrenched settlements that deter potential challengers from entering national electric sectors (Cooksey 2002; H. S. Gray 2015). One example are the barriers that exist to the entry of small power producers in Tanzania (Tenenbaum et al. 2014). Analogue barriers exist in generation, where Independent Power Producers find it difficult to undermine the ascendancy of state-owned utilities (Eberhard et al. 2016; Eberhard and Gratwick 2011). Public distribution companies successfully defend themselves against attempts to outsource their management to private contractors (Castalia Strategic Advisors 2005; Davies 2004; R. Ghanadan and Eberhard 2007) or to undergo meaningful organizational and sectoral reforms (Kapika and Eberhard 2012; Mbewe 1998; Tallapragada et al. 2009). From this perspective, breakthroughs in national electric regimes only happen after strategic transformations in the coalitions between state bureaucracies, donors and key economic actors (Girod and Percebois 1998; K. Gratwick, Ghanadan, and Eberhard 2006; Johnson 2010; Karekezi 2004; Malgas 2008; Marandu and Kayo 2004). The transition from a nuclear- to a petroleum-political configuration in Niger's 'resource assemblage' only took place after a rearticulation of business and state interests (Schritt 2016).

At this point it may be useful to draw inspiration from the literature on 'national regimes of accumulation' and, in particular, its translation into the South African context as the 'minerals-energy complex' (MEC). The MEC aims to explain the political economy of the mining and electric sectors in South(ern) Africa since its independence (Fine and Rustonjee 1996; McDonald 2009a). It postulates a systematic analysis of the solid, long-lasting bias in the energy sector in favour of deeply-entrenched big capital. As described by one later commentator

The MEC is a regime of accumulation based on low-cost state-owned electricity production (via Eskom) and cheap labour, the incorporation of Afrikaner political power into the mining sector under apartheid and the rationalisation of finance houses, since converted into large-scale national and international corporate capital, tightly bound to energy and mining capital (Baker, Newell, and Phillips 2014, 797).

The structural factors highlighted by this strand of scholarship evoke the persistence of earlier distributional concerns already present in the era of the pioneers of African power

sectors in South Africa in the late 19<sup>th</sup> century: 'discussion on this dry continent concentrated on identifying customers who would finance costs of production and distribution, and/or provide profits' (Showers 2011, 195). In the case of South Africa, mining provided the necessary load. In other markedly less industrialized countries, however, the responses developed by the ruling elites shaped the development of the power sector and, crucially, the relative weight of supply to industry and to citizens. In contemporary times, the MEC has inspired a reinvigorated assessment of the political economy of power sectors in Africa. With more than one nod to David Harvey (1982), David McDonald's (2009b) *Electric Capitalism* advances an updated MEC-plus model that seeks to account for the attempts of neo-liberal capitalist elites to reorganize the generation and distribution of electricity in South Africa. Whilst retaining the core ideas of MEC, MEC-plus also suggests the primacy of industrial interests, now shrewdly hidden under the guise of a progressive policy of township and pro-poor rural electrification:

My argument is that the low-quality infrastructure that is often provided in low-income areas, the starkly uneven pricing schemes and aggressive cost recovery that is taking place to collect these fees, as well as the meagre supplies of free electricity being offered, all suggest an electricity sector restructuring strategy that is designed to create the image of a progressive, developmental state in South Africa while the substantive investments and subsidies are being geared towards MEC-plus industrial and service sectors and elite residential consumers (McDonald 2009b, 27).

A MEC-inspired reading of the political economy of the South African electric regime suggests four axes of distributional contention: well-off vs. poor; industry vs. households; urban vs. rural; and centre vs. periphery (McDonald 2009a; Rehman et al. 2012). With consideration to the relative weight of each distributional issue, the findings about South Africa can confidently be extended to less developed electricity sectors throughout the continent.

MEC-plus also unveils a set of distributional issues with considerable endurance in the South African politics of electricity: a) the reliability of supply for (urban) commerce; b) the reliability of supply and quality of infrastructure to supply wealthy and middle-class customers; c) the newly connected mass of low-income customers (a result of South Africa's massive post-apartheid electrification programme); d) contested plans for privatisation and unbundling; e) uneven price structures, including free basic electricity; and f) cut-offs for

customers in arrears or who lack prepaid units (McDonald 2009b). Other scholars, not necessarily aligned with the framework of regimes of accumulation, add other contentious issues, including: built-in biases in tariffs in favour of sections of society, notably the better-off and the middle classes (Eberhard et al. 2008); utilities' plans to contain the aspirations of the poor by means of techno-political devices (Ruiters 2011; von Schnitzler 2013, 2016); or chronic yet scarcely perceptible underinvestment in dispensable districts, combined with concomitant overinvestment in politically advantageous areas (Briggs 2012; V. E. Kroth 2014; V. Kroth, Larcinese, and Wehner 2016; Rosenzweig 2015). It is the lasting adjudication of these set of distributional issues over a certain period, often within the range of at least one decade, that defines the formal as well as the informal rules of the 'distributional settlement' which is embedded within the national electricity regime.

The term distributional settlement immediately evokes the notion of a 'political settlement' advanced in studies of the Political Economy of development (Di John and Putzel 2009; Khan 2010; Putzel and Di John 2012). There exist, indeed, shared underpinnings, but also significant discrepancies. Besides its use in post-violence settings, studies have employed the term political settlement in two broad senses: in a loose sense, as a synonym of the ruling coalition (Abdulai 2017; Hirvi and Whitfield 2015; Whitfield 2011); and, more rigorously, to explore the consistency between the distribution of power in society and the distribution of benefits allocated by formal institutions (Behuria, Buur, and Gray 2017; Khan 2010). In all cases, the political settlements approach has brought about a healthy departure from a narrow focus on institutions toward a broader exploration of institutions within politics and power relations. This shift stands much in line with the concept of a distributional settlement, and its attention to bargains between various actors (state rulers, regulators, industrial interests, citizens, international companies, donor agencies, etc) in the electricity sector. But distributional and political settlements also differ in various aspects. One first departure is that the interrogations that animate the political settlements agenda differ ostensibly from those behind the concept of a distributional settlement. Practitioners of the political settlements approach are eager to know what settlements stimulate development (Hickey, Sen, and Bukenya 2015; Rocha Menocal 2015), the latter often equated with support to the productive sector. By contrast, the distributional settlements approach does not pursue to establish whether some arrangements are more developmental than others. More modestly, it aims to establish who gets what, when, and how, the canonical question in Political

Economy (Laswell 1936). A second difference is that whilst political the settlements approach is more processual, distributional settlements are mainly concerned with the outcomes of the political process, as reflected in formal policies as well as informal rules that govern electricity supply. When exploring distributional settlements in African countries, there is no necessity to hypothesise the weight of informal institutions in holding together the settlement, as the political settlements framework necessarily does (Behuria, Buur, and Gray 2017; Khan 2010) (important as informal institutions may eventually be). Lastly, a third difference concerns the inherent ‘methodological nationalism’ of the political settlements framework (Hickey 2013). Whereas political settlements direct the attention towards the ruling coalition within one country, the adjudication of distributional settlements in the electricity sector must perforce consider the crucial role of transnational actors, in particular donors and transnational companies, in the adjudication of the settlement.

But how do distributional settlements ‘travel down’ to sub-national units? Little work has been done to explore this geographical connection. One starting point for the geographical analysis of unevenness across scales is the political economy of rural electrification. Rural electrification produces a variety of socio-political arrangements. Indeed, schemes of rural electrification defy easy characterization. A survey limited to off-grid electrification systems has identified ten different types (Mandelli et al. 2016). Characteristically, the variety in models finds a parallel in policy instruments devised to encourage the uptake of electricity amidst rural populations. In so far as electricity charges are concerned, one common arrangement are lifeline tariffs for impoverished customers, a condition which many a rural customer can meet. Another instrument are cross-subsidies between urban and rural users of electricity, materialized in lower rural rates, or between industrial and household – including rural – customers. A third option subsidises connection fees, a very popular approach in many African countries. Similarly, the deployment of infrastructure in rural areas is also subject to a variety of modalities of support. Kenya and Tanzania have instituted rural electrification funds sustained by levies paid by every customer of the national utility. Overall, governments often are tempted to transfer a part or all of the financial burden of rural electrification to public power utilities, to the detriment of their balance sheets (Barnes 2007a; Bhattacharyya 2012, 2013a, 2013b; Cook 2011). In the institutional domain, two models have consolidated over time. The most common entails the creation of rural energy

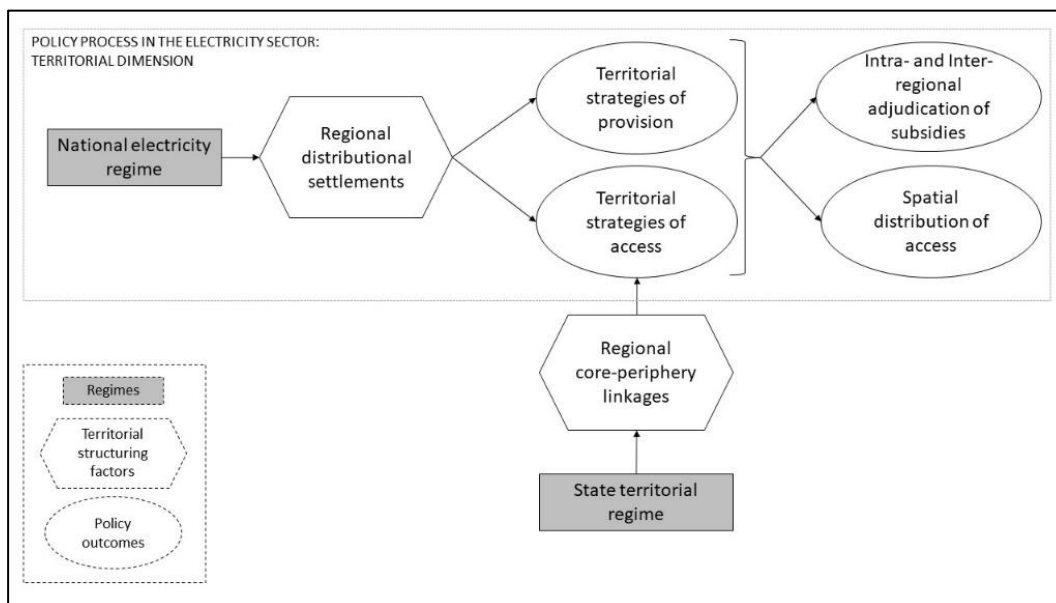
agencies; less commonly, countries such as Ghana have opted to mandate their national utilities to extend electricity to unserved rural areas (Massé 2010).

Needless to say, policy instruments for rural electrification are not politically neutral. Bureaucrats sitting in ministries of energy and planning agencies must decide whether to prioritize productive activities or to deem access to electricity as a basic service. The first approach tends to emphasize full-cost recovery, or at least recovery of operation and maintenance costs, whereas the latter often lends itself to ample below-cost provision. The choice has distributional repercussions, given that the beneficiaries of subsidies for productive undertakings are likely to be the well-off. A preference for productive activities may be implemented in terms of a stronger accent on non-agricultural activities and, consequently, at the expense of impoverished farmers. More broadly, there is ample evidence that subsidies aimed at increasing access to electricity are regularly misappropriated by the middle classes and the relatively wealthy (Rehman et al. 2012). Even policies apparently beneficial to broad sections of the populations, such as grid extension, benefit the relatively affluent in the short to mid-term, as they are the group most likely to be connected immediately after the grid arrives, reaping the benefits of public investments from earlier on (Cook 2011; Lee et al. 2016). Instruments such as lifeline tariffs may also disgruntle customers in the long run, as they tend to establish an upper barrier to what poor households consume that is difficult to overcome. Similarly, subsidized connection costs in donor-funded projects make it harder for standard customers to pay the regular connection fee (Ahlborg and Hammar 2014). Institutionally, and though the scholarship has avoided the topic thus far, it might be expected that giving primacy to utilities over electrification agencies, or vice versa, entails a redistribution of inter-organizational equilibria within public administrations, with consequences for the extant political settlement. A similar conclusion applies to decisions over who amongst strained public budgets, customers or donors must bear the bulk of the financial burden of rural electrification (Sovacool 2012). Out of the vast diversity of political dilemmas faced by rulers, the literature has nonetheless tried to single out a few commonalities. A useful comprehensive study synthesizes four key trends in the adjudication of distributional issues in rural electrification: a) the inclination toward supply-driven grid electricity; b) the existence of vested dynamics in favour of affluent and urban areas; c) the limited focus on ensuring availability and use; and d) the misdirection and misappropriation of subsidies (Rehman et al. 2012). All in all, and altogether with the key

distributional issues unveiled by the MEC literature, the list provides a tentative set of key issues in dispute between the state, key interests in the power sector and citizenship at large, that crystallise in distributional settlements. Virtually unexplored by the literature, the question remains open as to the extent to which the distributional settlement prevailing at the national level is altered when ‘travelling down’ to a certain region in which local factors such as the weight of each category of customers or the resource endowments may impinge upon its nature and effects.

As the two case studies in this thesis aim to illustrate, it is the examination of the interactions between core-periphery political linkages and the effects of distributional settlements in the periphery which provides a comprehensive explanation of the evolution of electricity supply in that region. Figure 5 provides a graphic representation of the idea.

**Figure 5: Interactions between core-periphery linkages and distributional settlements.**



**Source: Own elaboration.**

The figure summarises the core argument developed in this chapter. It illuminates how to disentangle the analytical problem of establishing how territorial strategies are formulated,

and in what proportion they respond to specifications from the electricity regime and from the state territorial regime. As discussed in section 2.2., core-periphery linkages may mould to a large extent the patterns of electrification in peripheral regions. They operate as a structuring influence upon the policy process that adjudicates public policies of access and provision of electricity. At the same time, and as discussed in section 2.3., the sectoral policies that stem from dominant distributional settlements also shape spatial patterns of access and patterns of subsequent everyday provision. Crucially, and as the two case studies in this thesis will show, sectoral policies may align or countervail the influence of core-periphery linkages. In the first case, sectoral policies may afford room for manoeuvre for political calculations; conversely, in the second case, sectoral policies may run against political interests aiming to provide access to electricity despite cost-benefit rationales. Chapters 3 and 4 unveil the determinant role of core-periphery linkages in shaping spatial patterns of access in northern Ghana and southeastern Tanzania, respectively. In turn, chapter 5 reveals the disparating effects in the two regions under scrutiny of sectoral policies at the national level and attendant regional distributional settlements over peripheral electrification. The overarching logic captured in figure 5 underpins the research design of this thesis, which intends to trace back observable spatial patterns of access to territorial strategies and, ultimately, to territorial and national electricity regimes, as presented in the methodological section in the Introduction.

## **2.4. Conclusion**

This theoretical chapter set out to elaborate a framework to interrogate the electric territorialities of the state that govern peripheral grid electrification. To that end, it has unveiled four political drivers of electrification in the peripheries. These four drivers structure the territorial strategies of electrification in the regional peripheries in conjunction with the distributional settlements that derive from the national electricity regime. All in all, this chapter has made two claims. One claim states that strategies of access derive not only from sectoral policies in electricity but also from the territorial politics of the state that are channelled through core-periphery linkages. The other claim argues that peripheral electrification cannot be understood without looking at the interactions between access and subsequent provision. The empirical chapters that follow aim to empirically flesh out the



claims made so far. They attempt to assign one primary driver of peripheral electrification to each of the case studies analysed. Since there are two cases (even though each case can be disaggregated into two sequential periods), it becomes obvious that exploring all four drivers is beyond the scope of this thesis. Northern Ghana is chosen to explore the electoral driver throughout the whole period under analysis and southeastern Tanzania to interrogate the strategic bargains between state and citizens over sub-national infrastructural grievances. Partial as this may be, it is forced by an estimate of what can be feasibly achieved by a work that, due to the virtual inexistence of a literature addressing both cases, is forced to start by reconstructing the events and the crucial junctures found along the way in the unfolding of the programmes of electrification under analysis.

In what follows, chapters 3 to 5 explore the territorial strategies that establish differential distributional settlements in the peripheries. Chapter 3 does so in northern Ghana for access; chapter 4 in southeastern Tanzania also for access; and chapter 5 for the comparison of both cases for provision. As mentioned in the Introduction, the methodological rationale runs contrary to the policy process. Firstly, territorial outcomes of electrification are identified; secondly, territorial outcomes are traced back to biases in the national policies of electrification; and thirdly, outcomes and policies are connected back to the structuring influence of core-periphery linkages. Chapters 3 to 5 highlight the heterogeneity introduced by territorial strategies that differ between peripheries and non-peripheries. By contrast, chapters 6 stresses opposite homogenizing effects. It brings to the fore the agency of state-owned distribution utilities, and the implications of that agency that run contrary to the strategies conceived by central state bureaucracies.

### **3 Territorial strategies of access in northern Ghana, 1989-2012**

The preceding theoretical chapter argued that state strategies to electrify peripheries are structured by national electric policies but also by political core-periphery linkages. In relation with the latter, this chapter examines electoral calculations by incumbents in the centre. Indeed, Northern Ghana is an apt example of how the electrification of peripheries may be largely governed by the electoral calculations of incumbents in the capital. This chapter will unveil the presence of those strategies with the help of techniques of spatial electoral analysis. The scrutiny of core-periphery electoral linkages engages with a growing body of research that points to the salience of the ballot box in public developmental programmes in the north of Ghana, against the backdrop of one of the most, if not the most, competitive bipartisan electoral systems across sub-Saharan Africa (Abdulai and Hickey 2016; Lindberg 2013; Nugent 1999, 2001, 2007; Whitfield 2009). So far, the electoral geography literature has paid little attention to the ongoing NES (Briggs 2012; Trotter 2016), despite its far-reaching impact not only on urban and rural electrification but also on the politics of electricity in the whole of Ghana.

Methodologically, this chapter seeks out the continuities across two sequential periods of electrification in the same geographical area. This approach rules out the influence of geographical variables that remain constant over the two periods: distance, demography, income and resource endowments. As the analysis below shows, in northern Ghana, demographic and income patterns did not vary substantially from 1989 to 2012, and when they did, their evolution kept the north in a similar relative position to the rest of the country. Likewise, resource endowments remained roughly the same, as there were no major

discoveries of minerals and large-scale cash crops did not expand. The sequential method in one country employed in this chapter prepares the ground for the subsequent comparative sequential analysis between northern Ghana and southeastern Tanzania.

The chapter is organized as follows. This first section reconstructs the evolution of the scheme of electrification across northern Ghana from 1989 through 2012. The account distinguishes two periods. In the first period, from 1989 to 2000, the national transmission grid reached the north of Ghana and later all the district capitals. In the second period, from 2000 to 2012, the grid expanded unevenly across the northern districts, whilst it also became denser across urban areas. The second section identifies the territorial outcomes of the electrification scheme, notably access rates at the district level. The following section identifies the territorial strategies underpinning such outcomes. The analysis situates the two periods along an extension-densification continuum for each of the three northern regions of Ghana. The next section explores which of the core-periphery political drivers may cogently explain the strategies and territorial outcomes observed and examines alternative explanations to the electoral calculations by incumbents in the centre. The conclusion connects the findings of this chapter with the analytical framework and offers some further questions.

### **3.1. The electrification of northern Ghana, 1989-2012**

#### **3.1.1. Background: An unelectrified *Afrique inutile*, 1901-1989**

The incorporation of Ashanti and the Northern Territories in 1901 as two distinct protectorates and the arrival of electricity in Ghana coincided in time (cf. the current administrative map of Ghana in the Appendixes). On the administrative side, the new structure inaugurated a period of direct military management in the north. The model would last until 1930, when it was substituted with “indirect rule” modelled on the Indian experience. In this second period, the British built up complicity with traditional authorities, regrouping diverse ethnic groups under their chieftaincy. Colonial authorities sought to avoid at any cost the evolution of chiefs towards an acculturated higher class detached from the “natives” that might pose a challenge to their form of rule, as they regretted had happened in the Akan areas (B. Kelly and Bening 2007; Ladouceur 1979). Most crucially, the widely held

assumption in the Colonial Office and the British administration in Accra since 1901 was that the final defeat of the Ashanti had ultimately paved the way for a long-awaited lucrative exploitation of the agricultural and mineral endowments in the south of the colony. Colonial authorities saw the north, by contrast, as a barren land, devoid of economic possibilities. The expected that their command 'will for some time to come be largely of a semi-military character' (Joseph Chamberlain, quoted in Plange 1984, 36). Its fate was also entrusted to the initiative of unsubsidized private enterprises, with public authorities only involved in 'suitable administration and the encouragement of the transit trade' (Governor Frederick Hodgson, quoted in Kimble 1963, 533–34). Transit trade had little to do with development; in the colonial parlour, it often meant the conscription of labour intended to work in the south, often in mines and cocoa farms (K. Q. Botchway 1998; B. Kelly and Bening 2007; Staniland 1975; Wilks and Ferguson 1970). The colonial reluctance to develop physical infrastructure in the north reached new heights in 1930 with the abandonment of the plans to build a railway line to the north.<sup>7</sup> The railway was supported by the United Africa Company and British cotton growers, but strongly opposed by big mining interests like Ashanti Goldfields and Lonrho, preoccupied with a foreseeable rise in the costs of their own northern workforce. The interests of the latter prevailed (Gariba 1989). Later on, no serious commercial exploitation of northern land was attempted until the Gonja Development Company's groundnut scheme in 1950—abandoned seven years later (Grischow 1999). Meat processing and tomato-canning were also promoted after independence, yet the results were disappointing (B. Kelly and Bening 2007). More generally, as mines in the south were deemed crucial, British administrators concentrated their energies on operating them efficiently. Small wonder, then, that in the early 20<sup>th</sup> century Gold Coast electric supply remained for many years confined to mines and factories. In this, Ghana replicated the pattern present in many African countries, in which industrial interests and affluent white suburbs operated as "neo-Europes" (Chikowero 2007; Coquery-Vidrovitch 2004; Showers 2011, 2014). On the Gold Coast, the first publicly operated power supply, operated by the Railway Administration in Sekondi, started to operate in 1914. On April 1926 the municipality of Koforidua started to operate a public supply scheme as well; Kumasi followed suit in October 1927 (ISSER 2005; Kuruk 1989). Remarkably, Accra's households were spared the

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<sup>7</sup> By contrast, transport was to absorb 75% of the budget of the global ten-year development plan of 1923, ultimately abandoned in 1927 (Kay and Hymer 1972).

benefits of electricity until 1947, despite the installation of a small power plant in 1922 (IBRD 1961; IBRD and IDA 1968). Almost without exception, urban distribution grids were supplied with diesel engines. The Public Works Department and the Railways Administration operated all schemes until 1947, when an Electricity Department was established within the Ministry of Works and Housing (ISSER 2005). Further north, only a few mines had secured autonomous power supply, amounting to 34 MW in 1960 (IBRD 1961). In 1938, authorities built a small power station in the largest agglomeration in the north, Tamale. All in all, at the time of independence in 1957 electricity hardly reached beyond the Accra-Tema sub-region (Barfour n.d.).

Independence transformed centre-periphery relations, particularly as it invigorated local politics and exacerbated political disputes. Chieftaincy soon came to play a major role (Lentz 2002). From the centre, the independent Ghanaian state would recognize in the north a degree of agricultural potential, at least for low-priced foodstuffs, and consequently try to encourage the transformation of subsistence farming into commercial ventures (Beckman 1981). The latter would translate into successive policies enacted by different political regimes supporting state farms (1961-1966), private commercial farms (1966-1972), private agrarian entrepreneurship (1972-1979), and integrated rural development (from 1980 to 1994). Deliberate strategies of political control, such as in the Dagomba area, remained uncommon (Boone 2003b), and some improvements took place under Nkrumah between 1959 and 1966 (Ladouceur 1979). With the fall of Nkrumah, centre-periphery politics gravitated towards public plans supporting either relatively affluent peasants, under Busia, or a new class of farmers, under Acheampong. This had some advantages for the north (Bob-Milliar 2011). In the seventies the highly publicized Operation Feed Yourself attempted to address escalating food prices by capitalizing on the potential of northern small farmers to produce inexpensive foodstuff for national consumption. Virtually for the first time in decades, the Operation represented a favourable bias toward the north. The influence of Northerners grew in the latter Acheampong and Limann administrations. One result was the overly ambitious Northern Region Rural Integrated Program (NORRIP), conceived to overcome poverty through multi-sectorial support for the informal peasants. After 1983, NORRIP had to cohabit with the focus on southern export agriculture of the Economic Recovery Program and the overall structural adjustment program (Gariba 1989). Despite the successive policy turns, however, throughout the seventies and eighties infrastructural

activity remained confined to roads and irrigation schemes for rice production, and NORRIP only brought about an increase in water supply schemes (K. Botchway 2001). The liberalization after 1983 paved the way for cheap imports of rice and tomato which seriously competed with key economic activities and sources of income in the north (Yaro 2013b).

Independence ushered in a brief yet far-reaching developmental thrust that overhauled the electric sector yet left the north untouched. In the south, one significant development was the expansion of the Tema diesel plant to 35 MW. This allowed a high-voltage line to be laid out from Tema to Accra to meet half of the capital's demand. Tema's refurbishment freed up three of the original engines, which were relocated to Tamale (ISSER 2005). Overall, by 1961 the Electricity Works Department had twenty-two diesel plants throughout Ghana, and in 1964, nearly half of the electricity generated was met with private generators (Kuruk 1989). Incremental improvements, however important, paled in comparison with the most grandiose of all developmental schemes of that time, the Volta River Project. In purely physical terms, the Volta River Project aimed to impound the Volta River and create the largest man-made lake in the world; build a hydropower plant of 588 MW; install a vast aluminium smelter downstream at Tema powered by the Akosombo Dam; considerably expand the Tema port; and, last but not least, erect a township at Akosombo. As the brainchild of president Kwame Nkrumah, the implications of the project were far-reaching. The Volta River Project envisaged a resolute, all-encompassing strategy of industrial take-off that implied social and geographical engineering of a herculean scale. After a lengthy negotiation process, involving the terms of the British and multilateral loans to Ghana for the dam, and also concerning the price of electricity supplied to the main off-taker, the Tema smelter, works in Akosombo began in earnest in 1961. The dam was finally commissioned on January 22, 1966 (Ayensu 2013; Faber 1990; R. Graham 1986; Hart 1980; Hilling 1965; Moxon 1984; Sawyerr 1990).

Steps were taken at the same time to set up the embryo of a national transmission network (see map in the Appendixes). The Appraisal of the Volta River Hydroelectric Project, an initiative funded with US\$ 47 million by the World Bank, received the stamp of approval in February 1962 (IBRD 1961). Its plan was to lay a ring of 165-kV electric lines linking Accra, Tema, Akosombo, Koforidua, Kumasi and Sekondi-Takoradi, as well as the mines in the vicinity of the ring (designed by the Canadian Acres International). The proposal for a grid was national only in name; as evident on a map (see the figure below), its morphology literally

outlined the geographical boundaries of what political and economic elites arguably imagined as *la Ghana utile* (Reno 1998). The Appraisal established as a self-evident truth that the north was not worth an extension of the grid. Accordingly, the World Bank did not even bother to provide a justification, let alone any figures, as to why the northern regions of the country were not considered for electric supply. The transmission network serving the south began operating in late 1965. As concerns the north, and despite Nkrumah's personal pledge to provide abundant cheap electricity to all Ghanaians (Hart 1980; Hilling 1965), electrification north of the Ashanti and the Volta regions was widely perceived as uneconomical and summarily discarded. This was the case even though government publicity portrayed the Volta River Project as a way to overcome the economic gap between north and south (Miescher 2014).

From the late 1960s to the early 1980s, electrification in the northern regions proceeded only in the major urban areas. However, the Progress Party regime of Dr. Busia, 1969-1972, mobilized the Rural Electrification Project to implement a disproportionate number of initiatives in the president's native Brong-Ahafo Region (Sackeyfio 2012). Another feat was the mandate given in the mid-1970s to ECG - by then the only public utility authorised to sell power to households - to install 19 local grids, fed by diesel plants, in the regional capitals and the main towns, a number of which were located in the three northern regions.<sup>8</sup> Bolgatanga already enjoyed electricity by the early 1970s, and Wa and Lawra were electrified in 1974 and 1975, respectively (Bob-Milliar 2011). By 1970, however, Accra still absorbed half of the electricity meant for public use in the country (Kuruk 1989). Even worse, in the third decade of independence the north-south supply gap was still so large that local diesel-fed grids north of Kumasi served as few as 20,000 customers, compared to 220,000 supplied by the grid in the south (World Bank 1987).

### **3.1.2. Northern Ghana electrified, 1989-2012**

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<sup>8</sup> In common usage, the north of Ghana is coterminous with the Northern, Upper East and Upper West regions. However, the distribution utility serving the north also supplies the upper fraction of the Brong-Ahafo and Volta regions. In this work, mentions to politics refer to the three northernmost regions, whilst references to electric supply in the north point to the geographical demarcation served by the utility (see map of the area served by the distribution utility in the north in the Appendixes).

The period 1989-2012 saw a relative improvement in the developmental condition of northern Ghana (Yaro 2013a). Physical assets such as boreholes, telecommunications, houses and electricity became more available; educational opportunities broadened and enrolment rates rose, in part as a result of the construction of many new primary schools; access to healthcare also improved, particularly across long-neglected rural areas; and economic opportunities diversified, northern economies became more monetised, and women attained an enhanced role in the household economy thanks to new income-generating activities (Dietz, Van der Geest, and Obeng 2013). Yet structural transformations in agriculture or industry failed to materialise, with the overall result that these improvements barely translated into an amelioration of the relative position of the north within Ghana. As the table 2 below illustrates, from the late 1980s to the 2010s the main demographic and economic indicators of the three northern regions did not reflect any relative progress with respect to national averages. In this sense, the most revealing indicator continued to be the persistent pattern of migration to the south in search for labour and economic opportunities. Despite a temporary decline in the 1970-1984 period, outmigration surged again from 1984 to 2000 (van der Geest 2011). Migration resulted to a sizeable extent from the incapacity of the region to fulfil its oft-expressed role as the breadbasket of Ghana (Bawayelaazaa Nyuor et al. 2016).

Yet by 2012, access to electricity in the three northernmost regions of Ghana had soared, in stark contrast with the condition of the region in the late 1980s. By then, access in the north was negligible, especially outside the three regional capitals and a handful of secondary towns, e.g. Bawku or Yendi. Even in the whole of Ghana, in 1990 only 28.5% of Ghanaians had access to electricity.<sup>9</sup> The rural communities fared far worse. Only 8.7% of rural dwellers had access to electricity (GSS 1995). But in the space of twenty-five years the number of households with access to electricity in the Northern, Upper East and Upper West regions surged from almost nil to 50, 51 and 67%, respectively (Ahiataku-Togobo 2014). The massive scale of the changes in access is captured in tables 3, 4, 5 and 6 and figure 6 below. In spite

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<sup>9</sup> As with many other statistics of access to electricity, this figure is disputed. The Ghana Statistical Service derives the national indicator from the Ghana Living Standards Survey conducted in 1991/92. But later on, the Ghana Statistical Service puts the figure at 29.8 (GSS 2000b). The World Bank situates national access in 1990 at 30.6%, drawing upon the United States Agency for International Development's (USAID) funded Demographic and Health Survey carried between September 1993 and February 1994 (GSS and MI 1994; World Bank 2013b).



of the minuscule population densities of 35 and 38 people/km<sup>2</sup> in Northern and Upper West (see table 1), by 2008 more than two-fifths and one-third of their respective populations had been connected to the grid. Curiously, the denser Upper East only attained a more modest 30%. Urban supply grew even faster: in 2000, urban access in Northern, Upper East and Upper West had attained approximately 62, 58 and 60%, respectively (World Bank 2007a); one decade later, access in Tamale, Bolgatanga and Wa, proxied by the percentage of people who reported their main source of lighting to be electricity from the mains, stood at 90.5, 53.5 and 81.5 (GSS 2013c, 2013a, 2013b). Remarkably, access also improved perceptibly across hitherto completely excluded rural areas where the vast majority of people live (GSS 2000b, 2012). For the Ministry of Energy (MoE), the figures would be even higher. Statistics of access from the census are consistently 5-10% below the corresponding figure from the Ministry. The explanation is that the Ministry computes access as the percentage of communities, not people, electrified which works to its own advantage. The Ministry only considers those communities with a population over 500 in its calculations. All in all, and in contrast to the meagre progress in most sub-Saharan countries, let alone in their peripheral regions, advances in the long-neglected north of Ghana were superlative.

**Table 1: Population density and key development indicators by region, 2010.**

| Region     | Population (millions) | Rural population (%) | Size (km <sup>2</sup> ) | Density (people/km <sup>2</sup> ) | Number settlements | Annual income (% national average) |
|------------|-----------------------|----------------------|-------------------------|-----------------------------------|--------------------|------------------------------------|
| Northern   | 2.48                  | 69.8                 | 70,384                  | 35                                | 4,025              | 119.3                              |
| Upper East | 1.05                  | 79.0                 | 8,842                   | 118                               | 1,391              | 50.6                               |
| Upper West | 0.7                   | 84.3                 | 18,476                  | 38                                | 1,178              | 49.8                               |
| SUBTOTAL   | 4.23                  | 74.5                 | 97,702                  | 43.3                              | 6,594              |                                    |

**Source: Ghana Statistical Service (2012).**

**Table 2: Evolution of demographic and economic indicators by region, 1991-2013.**

| Region     | Population density 1984 (%) | Population density 2000 (%) | Population density 2010 (%) | Household income 1991 (%) | Household income 1999 (%) | Household income 2013 (%) |
|------------|-----------------------------|-----------------------------|-----------------------------|---------------------------|---------------------------|---------------------------|
| Northern   | 33                          | 33                          | 34                          | 67                        | 68,5                      | 73,8                      |
| Upper East | 131                         | 131                         | 115                         | 78                        | 63,6                      | 43,5                      |
| Upper West | 39                          | 39                          | 37                          | 71                        | 63,6                      | 72                        |
| NATIONAL   | 100                         | 100                         | 100                         | 100                       | 100                       | 100                       |

**Source: Ghana Living Standards Survey (1995, 2000a, 2014) and Ghana Statistical Service (1987, 2002, 2012).**

**Table 3: Urban and rural rates of access per region per national census, 2000.**

| Region        | Urban rate of access | Rural rate of access | Population density, year 2000 (people/km <sup>2</sup> ) |
|---------------|----------------------|----------------------|---|
| Western       | 78.1                 | 20.7                 | 81  |
| Central       | 66.6                 | 23.4                 | 162   |
| Greater Accra | 82.9                 | 26.4                 | 896   |
| Volta         | 47.6                 | 18.0                 | 80  |
| Eastern       | 66.1                 | 15.8                 | 109   |
| Ashanti       | 81.7                 | 19.2                 | 148   |
| Brong Ahafo   | 68.0                 | 13.0                 | 46  |
| Northern      | 61.6                 | 5.4                  | 26  |
| Upper East    | 56.6                 | 3.2                  | 104   |
| Upper West    | 60.2                 | 2.9                  | 31  |
| All regions   | 74.6                 | 16.1                 | 79  |

Source: Ghana Statistical Service (2005).

**Table 4: Electrified communities and access rates by region, Ghana, 2008.**

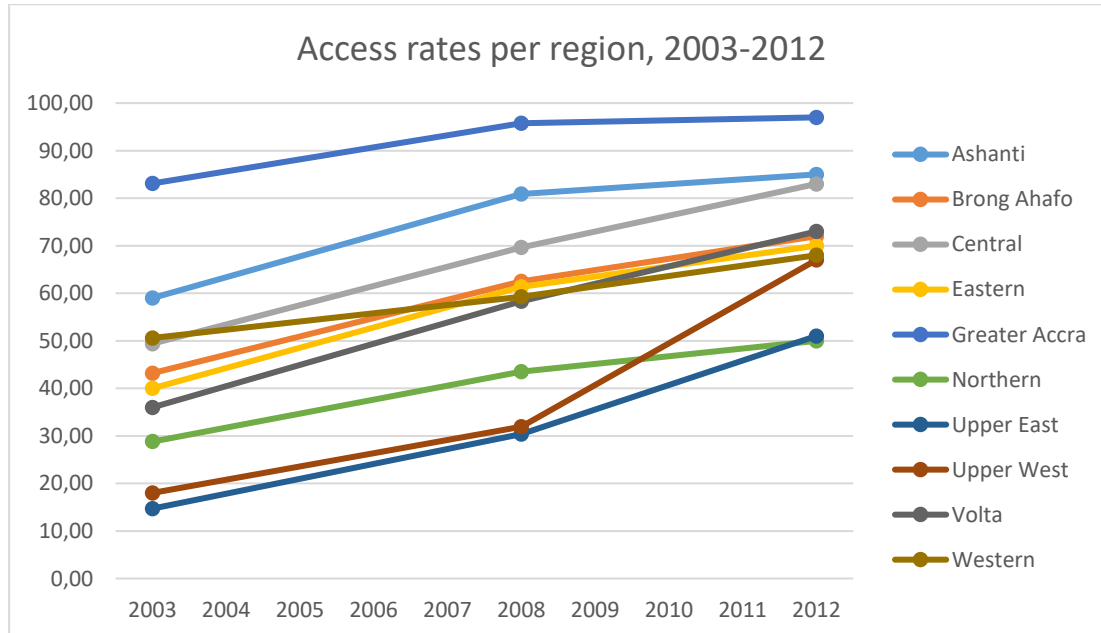
| Region        | Electrified communities |            |                          | Rate of access |
|---------------|-------------------------|------------|--------------------------|----------------|
|               | Communities             | Population | Population per community |                |
| Ashanti       | 1,021                   | 3,735,166  | 3,658                    | 80.9%          |
| Brong Ahafo   | 445                     | 1,399,903  | 3,146                    | 62.5%          |
| Central       | 464                     | 1,418,450  | 3,057                    | 69.6%          |
| Eastern       | 470                     | 1,589,509  | 3,382                    | 61.3%          |
| Greater Accra | 333                     | 3,615,565  | 10,858                   | 95.8%          |
| Northern      | 192                     | 1,091,015  | 5,682                    | 43.5%          |
| Upper East    | 139                     | 345,524    | 2,486                    | 30.4%          |
| Upper West    | 71                      | 228,040    | 321                      | 31.9%          |
| Volta         | 531                     | 1,180,601  | 2,223                    | 58.3%          |
| Western       | 404                     | 1,362,668  | 3,373                    | 59.3%          |
| TOTAL Ghana   | 4,070                   | 15,761,205 | 3,873                    | 66.7%          |

Source: Ministry of Energy (MoE), cited in Barfour (n.d.), and own calculations.

**Table 5: Un-electrified communities by region, Ghana, 2008.**

| Region        | Un-electrified communities |            |                          |
|---------------|----------------------------|------------|--------------------------|
|               | Communities                | Population | Population per community |
| Ashanti       | 18,662                     | 881,386    | 47.23                    |
| Brong Ahafo   | 17,111                     | 838,735    | 49.02                    |
| Central       | 7,828                      | 61,927     | 7.91                     |
| Eastern       | 12,661                     | 1,001,614  | 79.11                    |
| Greater Accra | 1,536                      | 159,506    | 103.85                   |
| Northern      | 3,833                      | 1,415,903  | 369.4                    |
| Upper East    | 1,252                      | 791,591    | 632.26                   |
| Upper West    | 1,107                      | 485,735    | 438.79                   |
| Volta         | 3,087                      | 843,276    | 273.17                   |
| Western       | 14,815                     | 935,105    | 63.12                    |
| TOTAL Ghana   | 81,892                     | 7,414,778  | 90.54                    |

Source: Ministry of Energy (MoE), cited in Barfour (n.d.), and own calculations.

**Figure 6: Access rates in Ghana per region, 2003-2012.**


Source: Ahiataku-Togobo (2014), Balfour (n.d.), Core Welfare Indicators Questionnaire Survey II (2003).

**Table 6: Penetration rate in northern regions according to number of customers served, 2013.**

| Region        | Total households | Total customers | Access (%) |
|---------------|------------------|-----------------|------------|
| Brong Ahafo   | 461,988          | 238,689         | 51.67      |
| Northern      | 342,450          | 131,021         | 38.26      |
| Upper East    | 162,356          | 67,080          | 41.32      |
| Upper West    | 98,667           | 46,905          | 47.54      |
| Total (NEDCo) | 1,065,461        | 483,695         | 45.40      |

**Source: Volta River Authority (VRA)/NEDCo (2013).**

Three actors propelled electrification in northern Ghana. The first actor was the MoE which oversaw the design and implementation of the two major projects of access. Two of them, the Northern Grid Extension Project (1987-1991), and the District Capital Electrification Programme (1994-2000), took the national transmission grid to the north and to all district capitals, respectively. The Ministry also managed two major programmes that acted as an umbrella intervention for successive rolling projects: the NES, and the Self-Help Electrification Programme (SHEP), both launched in 1990 and poised to achieve the self-imposed goal of universal electrification by 2020. In line with these responsibilities, the Ministry administered the funds funnelled to those projects from the state budget, loans from domestic banks, grants and loans from international development agencies, and a levy excised from users of electricity. The second major actor was the Northern Electricity Department (NED, later NEDCo), which supplied electricity to customers in the three northern regions, as well as across the northern swathes of Brong Ahafo and Volta (see map showing NEDCo's demarcation in the Appendixes). NED was created in 1997 *ex-nihilo* by the Ghanaian government with a specific mandate for the north. The last actor were the beneficiary communities, which contributed to their own electrification via the SHEP. Communities were expected to supply the poles required to connect them to a nearby distribution grid. All in all, the MoE retained the leading role in delivering access, as it administered the projects and the funds, and acted under a strong policy mandate from the State House.

### 3.2. Territorial outcomes

#### 3.2.1. Extension, 1989-2000

The MoE undertook management of extending the national grid to northern Ghana, initially, and then to all national district capitals. The Northern Grid Extension Project (September 1987 – January 1991) prolonged the national 161-kV grid to Techiman and Sunyani (both June 1989); from Techiman to Tamale (December 1989), onward to Bolgatanga (March 1990), and to Navrongo (August 1990), Bawku (December 1990) and Mim (December 1990).<sup>10</sup> Secondary 34.5-kV spurs were laid toward Berekum (May 1990) and Wenchi (July 1990).<sup>11</sup> Before the expansion, the backbone transmission grid did not stretch north of Kumasi, according to a topography that had remained largely unaltered since the inauguration of Akosombo (see map of current transmission network in Appendixes). The initial motivation of the project was probably to extend the grid to the north to then export electricity to Burkina Faso. Another alleged motivation was the Volta River Authority's (VRA) strategic re-positioning to cope with the impending threat of privatization (Edjekumhene and Dubash 2002). In either case, the project permitted electrifying the major towns of the north with relatively little additional cost.<sup>12</sup> Indeed, the geographical expansion of the grid was huge. The sheer scale of the expansion is neatly captured in map 3 in the Appendixes. The map portrays the 161-kV, 66-kV, 34.5-kV, and 33-kV lines existing in Ghana in the mid-2000s, which in northern Ghana basically coincide with the lines extended in the early 1990s. Remarkably, the co-existence in Ghana of two different distribution voltage standards, ie 34.5-kV and 33-kV, resulted from the Northern Grid Extension Project. The project set the distribution voltage in the North to 34.5 kV voltage, in stark discrepancy with the 33 kV at which ECG distributed power in the South. Why the voltage in the north was set to a different level is still unclear today. Some blame the alleged influence of a consultant from the US, a country in which 34.5

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<sup>10</sup> By 1991 all major grid extensions had been carried out. However, minor remaining extensions were completed by the end of 1993 (World Bank 1993a).

<sup>11</sup> It is worth noting that by laying 34.5-kV lines a significant discrepancy was created with the ECG-supplied demarcation, where equivalent lines were constructed for 33 kV. As noted below, this disparity was later employed by some as an additional motivation against merging NED and ECG.

<sup>12</sup> The project files of the World Bank component include a "Prefeasibility study of a transmission line from Akosombo to Tamale, Bolgatanga (Ghana) and to Ouagadougou (Upper Volta)," prepared by Prof. Dr. Francesco Iliceto (Italy) in August 1983 and a "Burkina Faso-Ghana Interconnection Study. Case 4. Double-Circuit Line West of Lake Volta, Technical Note," prepared by Acres International (Canada) in December 1985 (World Bank 1987, iii).

kV is widely used for rural distribution; others blame the Irish Electricity Board, which was also involved in the early stages of the electrification programme in Ghana (NEDCo Head of Public Affairs and Community Relations 2013; NEDCo Planning Engineer 2013). The decision would nonetheless prove to have far-reaching consequences, as future schemes to enhance the financial prospects of NED through a merger with ECG would be abandoned, amongst other reasons, due to the technical barriers posed by the need to operate grids of different voltage (Former NED Commercial Manager 2013). To finance the construction of hundreds of kilometres of transmission grid, the government of Ghana secured the financial assistance of the African Development Bank (AfDB), the Commonwealth Development Corporation of the UK and the European Investment Bank, all of them coordinated by the World Bank.<sup>13</sup> Being the operator of the national transmission grid, and in consequence the final recipient of the funds for the implementation of the project, VRA was also asked to contribute (World Bank 1987, 1993a). All in all, the grid made a dozen large diesel plants in different towns redundant. Supply from the grid instead of from diesel generators vastly improved its quality and reliability, thereby also adding to the expansion of demand (VRA 1990, 1991; World Bank 1993a). As is to be expected, the first new customers were better-off households and businesses. Over time, however, the customer base grew slowly but steadily until 2000 (see figure 7). Later on, the growth in the customer base was stimulated by the MoE's second major project: the District Capital Electrification Programme. This project came along in association with the World Bank's National Electrification Project (1994-2000). In the three regions of northern Ghana, the last batch of district capitals was connected to the grid by the World Bank's National Electrification Project (April 1994 – March 2000). As its name implies, the District Capital Electrification Programme's main goal was to connect all 110 district capitals to the national transmission and distribution grid (World Bank 1993b, 2001a).

The rolling programmes managed by the MoE had an even more lasting impact. Initiated in 1989, the NES envisaged six successive phases five years long each. From its early days, the ultimate goal of the NES was to bring electricity to all Ghanaians by 2020, irrespective of their location (Edjekumhene and Brew-Hammond 2003; MoE 2010b). Worth noting here, nevertheless, is that the goal of universal electrification was since the onset set to apply

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<sup>13</sup> Other minor donors were the Canadian International Development Agency and the Kuwait Fund. Although the World Bank's financial contribution was relatively modest, it played a significant role initially, in designing the programme, and subsequently in coordinating the consortium of donors (World Bank 1987, 1993a).

exclusively to the 4,175 settlements with populations over 500 identified in an earlier National Electrification Planning Study, of which 478 were already supplied, and that communities under the 500 were never considered for electrification.<sup>14,15</sup> This ambitious goal was premised on a novel approach that identified and lumped communities into a limited number of packages of grid-based electrification. In the first phase, 69 packages were identified (Barfour n.d.) and presented to international donors for funding. The latter were invited to fund one or several projects simultaneously. Ghanaians were also required to contribute a 1% National Electrification Levy, which was incorporated into the tariff. The funds raised fed a National Electrification Fund (Barfour n.d.; VRA 1990). At its onset, the NES experienced some delays, and the first two quinquennial phases were finally merged into a single programme running from 1995 to 2000. This five year programme focused upon taking the grid to the 23 district capitals that remained un-electrified in 1995 (World Bank 1993b, 2001a). The other component of the programme envisaged the connection of a first batch of rural communities. By the decade's close, a total of 1,909 communities had gained access thanks to the NES (MoE 2010b).<sup>16</sup> This component would prove more sensitive politically. Indeed, the most senior manager of the NES in the MoE recognized that the communities were selected following several criteria, including the potential for small-scale industry activity, status as a commercial market centre, tourism potential, historical importance of the area, but, significantly, also 'political dispensation' (Barfour n.d.).

Political dispensation also played a major role in the unfolding of the fourth major project managed by the MoE: the Self-Help Electrification Program. The SHEP was launched with the specific goal of improving access in remote rural areas. Communities less than 20 kilometres away from the existing grid, and having wired one third of the houses in the community by their own means, were eligible for an extension subsidized by the SHEP (Edjekumhene and Dubash 2002; GoG 2012; MoE 2010b). The SHEP was also conceived of as a rolling

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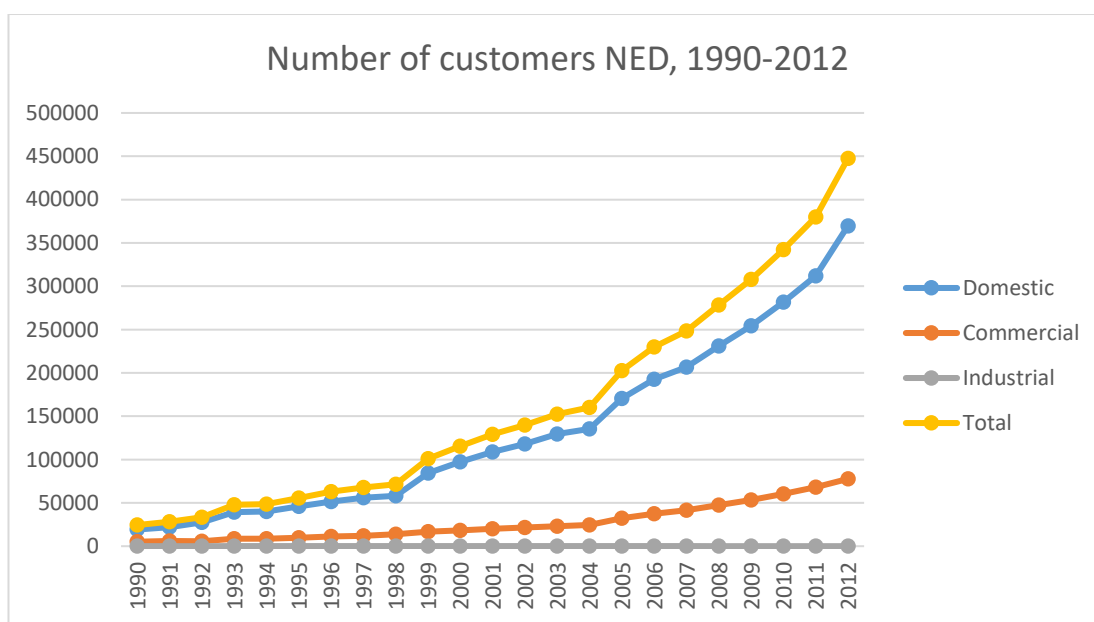
<sup>14</sup> The National Electrification Planning Study was financed by the World Bank and the Canadian government, under a parallel Fifth Power Project (January 1990 - June 1996) seeking to improve the performance of ECG. The Study was conducted by Acres International Ltd (World Bank 1997).

<sup>15</sup> The National Development Planning Commission slightly raises the figure of communities originally identified to 4,221 (NDPC 2005).

<sup>16</sup> Of these, by 2012, 500 communities in the north had been reportedly connected thanks to the World Bank's project (World Bank 2005). As far as bigger settlements are concerned, by the end of the 1990s only 139 towns had been connected in Northern, Upper East and Upper West (Abavana n.d.).

programme, set to be implemented at the same time as the NES. Accordingly, five rounds of SHEP had been launched as of 2015. SHEP 1 (1990-91) and SHEP 2 (1992-94) were run as pilots, covering 50 and 250 communities respectively. SHEP 3, though, made a quantitative leap, aiming to cover 1,400 communities. SHEP 3 had to be subdivided into three sub-phases: SHEP 3-1 (1996-98), benefitting 170 communities; SHEP 3-2 (1998-2000), reaching 480 communities; and finally SHEP 3-3, addressing 700 communities (JICA and YACHIYO Engineering 2006; MoE 2010b).<sup>17</sup> By 2005, the SHEP had already connected 1,673 communities (MoE 2005). The need to ensure the involvement of the communities in the SHEP projects soon proved a conduit for local political patronage. In an unspecified proportion of SHEP projects, the communities managed to elude their contribution in poles thanks to the contributions of District Assemblies or Members of Parliament (MP). This enacted created a serious difference between communities and peri-urban areas. In demarcations where both types of projects were implemented simultaneously, conflicts soon arose (JICA 2008).

**Figure 7: Number of customers per category, NED, 1990-2012.**



**Source: Unpublished data from NEDCo. Note: Industrial customers, never more than 40, are too few to be represented.**

<sup>17</sup> According to Abavana (n.d.), final figures differ slightly.



### 3.2.1. Extension and densification, 2000-12

Electrification efforts continued unhindered throughout the 2000s, both through the NES and SHEP. With NES increasingly leaning towards extending the grid to rural communities, between 2003 and 2012 the rates of access increased by two-thirds in the Northern region and doubled for Upper East and Upper West (see figure 6). At the end of 2009, the total of electrified communities in Ghana amounted to 4,132, and 84,813 remained un-electrified (tables 4 and 5) (MoE 2010b). Table 7 details the evolution along the implementation of the NES. The customer base of NED in 2013 spurred (see table 6, for 2013). Access also grew thanks to the World Bank's Ghana Energy Development and Access Project, which set out to connect 20,000 new customers in 151 towns and villages (World Bank 2007a). In this general trend of expansion, between 2008 and 2012 access increased in Upper West much more sharply than in Upper East, and greatly more than in the Northern region (see figure 6 and tables 8 to 10). Tellingly, SHEP survived the ups and downs of the Ghanaian economy. SHEP 3 ran through a plunge of cocoa duties and donor funding, and concomitant severe budget restrictions across public services (Briggs 2012). Thus grid extension resumed after a hiatus in which some considered the SHEP defunct (Eberhard et al. 2008). The programme revived in 2006-7 thanks in part to a loan from the U.S. Ex-Im Bank, 2009-2013, for US\$ 350 million. All in all, the Ghanaian state contributed more to the SHEP than to the NES. By the late 2000s two-thirds of the overall budget of SHEP had been funded by Ghana's own means, including the 1% levy on the tariff (Eberhard et al. 2008). The balance was completed to a large extent thanks to various donors (Barfour 2009). SHEP 4 (2006-2013) aimed at targeting a total of 2,840 communities (Barfour 2009).<sup>18</sup> SHEP 4-1, 4-2, 4-3 and 4-4 reached 193, 226, 229 and 269 communities, respectively (Abavana n.d.). The bulk of the SHEP projects, ie SHEP 3 and 4, achieved less in the three northern regions, though. They accounted for only 19.3% of all projects (NDPC 2005), which situates the number of communities reached by SHEP 3 and 4 at about 800. Finally, and according to media reports, SHEP 5 was launched around 2015,<sup>19</sup> thanks to a significant extent to the proceeds from the 2013 Eurobond.<sup>20</sup> Overall, the surge

<sup>18</sup> The figure of 2,840 targeted communities is congruent with the number of 2,850 communities earlier put forward by the MoE (MoE 2005).

<sup>19</sup> See for instance <http://ghananewsagency.org/social/new-shep-5-project-launched-in-upper-west-107101> (accessed January 16, 2017).

<sup>20</sup> Source: <https://www.csd.com.gh/market-info/market-news/479-government-receives-eurobond-proceeds.html> (accessed January 16, 2017).

in access in the north and countrywide was so considerable that on July 4, 2013 the MoE announced its commitment to achieving universal electrification by 2016 (MoE 2013), four years ahead of the goal set in the National Energy Policy approved in 2010 (GoG 2010).

**Table 7: Number of electrified communities in Ghana as of 2010.**

|                       | 1990-2000 | 2001-05 | 2006-10 | Total |
|-----------------------|-----------|---------|---------|-------|
| Number of communities | 1,909     | 1,080   | 1,824   | 4,813 |

**Source: NES Master Plan Review (MoE 2010b).**

**Table 8: Access rates by district in 2010 in the Northern region.**

| District            | District access rate | Access rate, urban | Access rate, rural |
|---------------------|----------------------|--------------------|--------------------|
| Tamale Metropolitan | 82.2                 | 90.5               | 42.4               |
| West Gonja          | 49.1                 | 73.7               | 22                 |
| Yendi Municipal     | 40.3                 | 74.5               | 14.6               |
| Savelugu-Nanton     | 42.0                 | 53.1               | 34.5               |
| Tolon               | 39.2                 | 72.5               | 34                 |
| Mamprusi East       | 38.7                 | 77.5               | 16.3               |
| Kumbungu            | 38.5                 | 0                  | 38.5               |
| Mamprusi West       | 36.1                 | 66.2               | 16.5               |
| East Gonja          | 32.1                 | 76.3               | 19.1               |
| Nanumba North       | 31.1                 | 64.9               | 16.8               |
| Nanumba South       | 30.4                 | 76.1               | 19.4               |
| Kpandai             | 29.6                 | 73.9               | 24                 |
| Bole                | 23.8                 | 77.5               | 7.3                |
| Zabzugu             | 21.5                 | 70.1               | 4.2                |
| Chereponi           | 20.3                 | 88.4               | 4.5                |
| Saboba              | 19.0                 | 68.0               | 11.9               |
| Gushiegu            | 18.2                 | 60.3               | 5.4                |
| Karaga              | 18.1                 | 38.2               | 12.8               |
| Tatale Sanguli      | 16.4                 | 53.7               | 7.6                |
| Sawla-Tuna-Kalba    | 16.0                 | 65.7               | 4.2                |
| Central Gonja       | 15.3                 | 53.3               | 4.7                |
| Bunkpurugu-Yunyoo   | 9.9                  | 48.2               | 1.6                |

**Source: Regional and district level reports, based on GSS (2012).<sup>21</sup>**

<sup>21</sup> Access rates for West Gonja, Zabzugu, Yendi Municipal, Tamale Metropolitan and Mamprusi West reported in the region- and district-level reports differ. Closer inspection revealed that district-level report figures are more accurate. Accordingly, table 8 incorporates the latter.

**Table 9: Access rates by district in 2010 in Upper East region.**

| District             | District access rate | Access rate, urban | Access rate, rural |
|----------------------|----------------------|--------------------|--------------------|
| Bawku Municipal      | 53.6                 | ---                | ---                |
| Bolgatanga Municipal | 53.5                 | 78.2               | 22.7               |
| Kasena Nankana East  | 28.8                 | 65.6               | 13.9               |
| Pusiga               | 20.9                 | 29.8               | 18.4               |
| Bawku West           | 14.3                 | 47.7               | 10                 |
| Binduri              | 13.0                 | 0                  | 13                 |
| Kasena Nankana West  | 12.7                 | 44                 | 7                  |
| Bongo                | 11.5                 | 53.5               | 8.1                |
| Garu Tempene         | 11.1                 | 58.3               | 8                  |
| Nabdam               | 8.6                  | 0                  | 8.6                |
| Talensi              | 7.1                  | 8.2                | 6.9                |
| Builsa South         | 6.7                  | 0                  | 6.7                |

**Source: Regional and district level reports, based on GSS (2012).**

**Table 10: Access rates by district in 2010 in Upper West region.**

| District             | District access rate | Access rate, urban | Access rate, rural |
|----------------------|----------------------|--------------------|--------------------|
| Wa Municipal         | 72.1                 | 81.5               | 48.4               |
| Sissala West         | 41.9                 | 0                  | 41.9               |
| Sissala East         | 36.3                 | 82.3               | 19.8               |
| Lawra                | 29.6                 | 83.3               | 19.5               |
| Nandom               | 27.0                 | 75.9               | 17.1               |
| Nadowli-Kaleo        | 23.0                 | 0                  | 23.0               |
| Daffiama-Bussie-Issa | 21.0                 | ---                | ---                |
| Lambussie Karni      | 19.7                 | 58.2               | 12.6               |
| Jirapa               | 18.8                 | 59.7               | 7.8                |
| Wa West              | 9.5                  | 0                  | 9.5                |
| Wa East              | 9.2                  | 0                  | 9.2                |

**Source: Regional and district level reports, based on GSS (2012).**

### **3.3. Territorial strategies of access, 1989-2012**

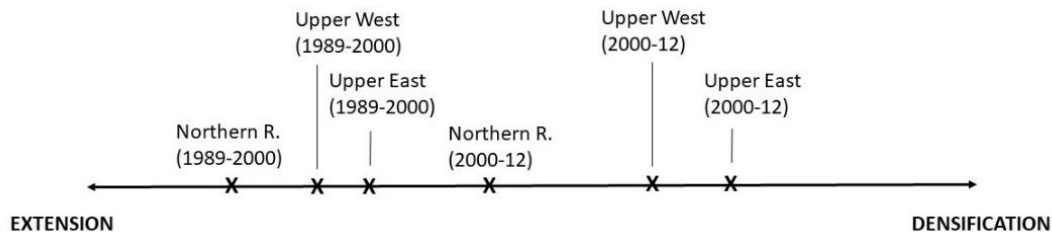
If the first decade of electrification focused upon district capitals and some scattered rural communities in the three northern regions, the second decade focused on Upper East and Upper West. This made economic sense, as both regions have the highest density of

population per un-electrified community for the whole of Ghana, and therefore the higher ratios of return on investment. One additional reason for the preeminence of Upper West can be found in the way access is computed by the MoE. As the Ministry calculates the rate of access on the basis of the communities (not population) connected, Upper West enjoyed an edge over Upper East due to its higher rural density. In the west, rural settlements are mostly concentrated on both sides of a north-south line that cuts across the capital and, crucially, overlaps with the layout of the national transmission grid in the region. In Upper East, even though the most populated rural settlements have higher densities and are in the vicinities of the grid, they also lay split into areas. Geographical patterns, however, hardly explain the sharp divergence in the growth of the access rate in both regions, in the absence of additional explanations beyond those relying on purely cost-benefit, technical or commercial criteria.

During the two phases of electrification in Ghana, one recurrent theme was the dilemma faced by planners in Accra, but also by NED's staff in the region, between (rural) extension and (urban) densification. The dilemma was resolved differently in each phase. The outcome in 1989-2000 and 2000-12 is represented in figure 8 below. The figure depicts an axis with extension to rural areas at one end, and densification in urban areas at the other end. Each of the three regions of the north of Ghana is represented qualitatively in its relative position along the extension-densification continuum in the first and the second phase of electrification. According to the data presented above, rural extension was pursued with more intense vigour in the Northern region between 1989-2000. This is hardly surprising, given that the Northern region is, by far, the largest of the three regions, and therefore extending the grid to each of its district capitals meant a considerable effort. At the other end, Upper East, much in line with its density patterns, had relatively less rural extension and more urban densification in 1989-2000. In the second period, urban densification gained prominence in all three regions, and accordingly they all became closer to the densification end. However, differences in spatial strategies persisted, and, again, the Northern region underwent more rural extension than the other two. Tables 8, 9 and 10, which summarize rural and urban access rates illustrate, how a few districts of Upper West were subject to noticeable efforts of rural electrification despite their low densities and relatively big size. Together with the pattern in the Northern region over two decades, the settlement of spatial

strategies of electrification from 1989 to 2012 points to calculations that exceed beyond merely developmental or cost-efficiency criteria.

**Figure 8: Territorial strategies of access in northern Ghana, 1989-2012, along the extension-densification continuum.**



Source: Own elaboration.

### 3.4. Core-periphery linkages, 1989-2012

To explore in detail the political calculations underlying the preliminary spatial patterns of electrification identified so far, this section draws upon the set of four core-periphery linkages in electrification identified in the theoretical chapter, namely: a) the search for narrow electoral gains; b) legitimacy building for regimes and states; c) regional economic re-engineering; and d) elite bargains around demands from sub-national actors (eg local infrastructural grievances). Attempts to re-engineer the economy of northern Ghana through electrification can be easily ruled out, given that electricity overwhelmingly targeted households and commerces (see figure 7). More generally, also, economic development strategies (notably schemes such as the Savannah Accelerated Development Authority, SADA) were few, and implemented with limited conviction and still less success (Eguavoen and Schraven 2013). Similarly, and despite the contentious nature of politics in the region, demands from sub-national political and economic elites, as well as from other actors, generally found only partial echo in Accra (Abdulai 2012, 2017; Abdulai and Hickey 2016). Whilst it is true that electrification in particular generated a bottom-up mobilisation of the communities to claim a connection to the grid, as shown below, the general impression is that the demands of each community did not combine with analogue claims beyond its own geographical boundaries. Accordingly, narrow electoral gains and legitimacy building appear

as the most promising candidates for political calculations behind electrification in the region. The analysis in this and the next section presents the evidence that shows that electoral and legitimizing factors were both present and determinant; but also, that in some instances electoral calculations prevailed over legitimizing aims, as demonstrated by the electrification of a non-negligible number of sparsely populated districts in the region.

### **3.4.1. Legitimacy building**

In the 1990s, the National Democratic Congress (NDC) government continued to accord attention to rural communities to improve their living standards in an effort to stop the flow from rural to urban areas. Rural electrification policies became an advantageous tool after a decade of economic hardship in rural areas in which the NDC party did not necessarily think it would perform well in elections. According to an official associated with the NES and the SHEP in the Energy Commission, the NDC government came to be known as the 'electrification government', and 'electrification had become a political tool so that no government could afford to take for granted; if not, they wouldn't be around' (Sackeyfio 2012, 189). In communities,

Rural voters across the country now utter the popular slogan 'no electricity, no power,' suggesting the politically salient issue of public service/goods provision. As number of interviewees in parliament established, rural voters are vocal enough to ensure the defeat of MPs who fail to implement projects like electrification or secure dates when their community will be connected to the grid (Sackeyfio 2012, 192).

At the onset of the programme of electrification in the North, the presidential directive to reach all district capitals prefigured the political tenor that the programme would adopt over the following two decades. From 1989 to 2000, the transmission grid reached the region for the first time, all district capitals were connected to the national grid, and the largest urban areas, e.g. Tamale, Bolgatanga, Bawku, Wa, saw a steady if modest increase in the number of customers served by NED (see figure 7). The existence of a strong developmental drive is undeniable, as well as the governmental intention to buttress its legitimacy and that of the regime. Flight Lieutenant Rawlings's revolutionary government was determined to redress historical injustices perpetrated against the north but after the introduction of multiparty

elections in 1992, it soon became evident that the north would constitute a major granary of votes for the ruling party. This reinvigorated the urge to provide access to electricity, especially to rural communities long excluded from social services. Importantly, the relative irrelevance in the numbers of customers connected in the north compared to those in the south did not set off any alarms in key powerful actors who at the time advocated for sectoral reform, e.g. International Monetary Fund (IMF) and World Bank. In 2000, NED served 115,000 customers and ECG 817,000 (EC 2013).

The mandate to electrify all district capitals was very much in line with the take on infrastructure adopted by President Jerry Rawlings after his ascension to power. Coinciding with the inauguration of the Kpong Dam in July 1982, Rawlings stated:

We have to look back at this stage in our history and pay tribute to the foresight of Dr. Kwame Nkrumah, first President of this country and his team, who pushed through the Akosombo project. It is staggering to contemplate what would have been our situation now if we had to rely principally on oil for the generation of electricity.<sup>22</sup>

Soon, the oft-repeated revolutionary motto of ‘power to the people’ took on a new, literal meaning (Agyeman-Duah 1987; Hansen 1991; Jeffrey Haynes 1987). The Provisional National Defence Council regime resurrected Nkrumah’s legitimizing narrative of electricity for all Ghanaians. It mobilized a case for the urge to redress historical injustices perpetrated by colonial authorities and post-Nkrumah regimes vis-à-vis the three northernmost regions, thus seeking to increase the legitimacy of his regime after the policy U-turn of the Structural Adjustment Program. Accordingly, in public discourse the electrification of the north was framed as the enactment of a right to enjoy access to electricity associated with economic and social citizenship. This did not always translate into policies, however,<sup>23</sup> but Rawlings drew on the legacy of Nkrumah that acutely equated electricity with modernity, a legacy that Rawlings rescued and revived to his own advantage.<sup>24</sup> The National Democratic Congress

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<sup>22</sup> Source: [www.jjrawlings.info/documents/speechatvra.pdf](http://www.jjrawlings.info/documents/speechatvra.pdf) (last accessed, May 14, 2017)

<sup>23</sup> For instance, Vision 2020, produced in 1995-96, fails to mention the Northern Electrification Scheme. Even though it highlights the importance of electricity supply for long-term development, it does not make any explicit reference to taking electricity to the more deprived north (GoG 1996).

<sup>24</sup> As much as Nkrumah and Rawlings may have mobilized electricity politically under very disparate conditions, the argument that Rawlings furthered ‘neo-liberal self-help’ in this domain, as argued by MacLean et al (2016), seems a considerable overstatement. As many have presciently noted, tagging the Rawlings regimes ideologically is to walk down a slippery road (Jeffrey Haynes 1987; B. Kelly and

(NDC) was more conveniently positioned, as its claim to heir of the Nkrumah/Limann tradition was widely accepted as legitimate (Nugent 1995). Resuscitating the narrative of Nkrumah was an convenient development, as his narrative was extremely appealing in its elevation of electricity as the enshrinement of modernity and development (L. MacLean et al. forthcoming; L. M. MacLean et al. 2016; Miescher 2014; Miescher and Tsikata 2010). Furthermore, as Nkrumah had ultimately failed to make good on his promise to take electricity to the north, Rawlings could convincingly claim to be taking up the baton. In so doing, he would finally realize yet unfulfilled promises enshrined by Akosombo. In addition, he could simultaneously legitimize the state both in the north and across Ghana in terms that extolled its capacity to yield development and its determination to redress regional inequalities. The symbolic mobilization of a reinvigorated narrative was accompanied by developments of a more material tenor. The message, as recoiled by a senior manager in VRA, passed clearly: 'take the power to the North' (VRA Director of Business Planning and Development 2013). The political decision to extend the national grid to the north, however, was made only later in the mid-1980s. The speech at Kpong mentioned mini-hydro schemes as the only solution to the problem of lack of access to electricity in rural areas (Rawlings 1982).<sup>25</sup> One likely influence in this drift towards a more systemic solution was the improved macro-economic landscape after the Economic Recovery Program kicked off in 1983 (Miescher and Tsikata 2010). By 1989 only 46 district capitals were served by the national grid. VRA/NED complied with the presidential mandate with outstanding performance. It took them only nine years to reach all district capitals in the country (Abavana n.d.; Barfour

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Bening 2007; Nugent 2007). The use of the expression 'neo-liberal self-help' is especially flimsy as far as the north is concerned, particularly if it is expected to be applicable to the Self-Help Electrification Programme. First, under Rawlings the SHEP was more a pilot programme than a full-fledged public intervention, and accordingly reached a very limited number of communities, as pointed out in this chapter. Also, where implemented, it garnered extensive public support, both through formal and informal conduits. Second, even if the SHEP is recognized more for its discursive value than for its material substance (as it also synergized with the much more influential electrification of district capitals happening at the same time), it still appears awkward, to say the least, to intimate that 'under this authoritarian period of PNDC [Provisional National Defence Council] rule, this obligation [paying taxes to fund, amongst other things, electrification] was not framed as a reciprocal expectation of citizenship, but, rather, as a condition of future economic development' (L. M. MacLean et al. 2016, 573). The literature has established that the costs of the Structural Adjustment Program of the late 1980s and early 1990s fell disproportionately onto the shoulders of urban populations, whilst rural areas benefitted from improved service provision to a certain extent (Herbst 1993). This realization carries even more weight in the north of Ghana.

<sup>25</sup> Already in 1981-82 Italconsult (Italy) had undertaken a technical analysis looking into the feasibility of extending the transmission grid to the north (VRA 1982).



n.d.), again a very remarkable feat in a regional and temporal context in which national budgets were strained by the consequences of structural adjustment programmes.<sup>26</sup> Reaching each and every district capital entailed extending the grid over wide swathes of land, particularly in the Northern region, where some district capitals are located at a substantial distance from the nearest main road.

Soon, the electrification scheme became exceedingly politicized and deviated from an ideal purely commercial approach, according to technical and commercial staff at NED (NEDCo Planning Engineer 2013; NEDCo Principal Marketing Officer 2013). Indeed, for NEDCo staff the political preference in Accra for access regardless of cost “derailed” the whole electrification process. The funds thrown into rural electrification deprived of badly needed investments other sectors of the economy. Even in the energy sector, they were not allocated to replace aged transformers in urban areas instead, an crucial investment for adequate reliability and quality of supply (Former NED Commercial Manager 2013). With so many rural electrification projects outsourced to contractors, it was difficult for NEDCo to maintain the technical standards of the grid. Sometimes the size of the conductors was too small; single-phase transformers were used in lines that soon called for a new three-phase transformer due to a load increase; and the poles were not treated chemically, only painted (NEDCo Planning Engineer 2013). Tellingly, in the run-up to the elections, electrification projects sped up. The months immediately prior to the elections in December were a time of frenetic infrastructural activity (GRIDCO operational staff in Northern Region 2013). As far as the choice of communities was concerned, a senior officer of the Ghana Energy and Development Access Project (GEDAP) in the MoE acknowledged that communities with less than 500 people were not targeted, according to the criteria in the NES, unless they were ‘politically connected’ (GEDAP Director 2013). In facilitating access to communities, District Assemblies went beyond their jurisdiction. Initially supposed to assist the MoE in singling out the towns to benefit from the programme, they turned into political machines advocating for power for their communities. Likewise, communities, expected to provide the poles, and pay one cedi for connection and wiring, managed to escape doing so. The government increasingly started to foot the bill to extend the grid. In fact, according to NEDCo staff, it is the government who

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<sup>26</sup> Bear in mind that the number of districts was increased in 1988 from 65 to 110 (Ayee 2013; Bening 2012). Forty-five new, mostly non-electrified district capitals were created overnight. In fact, one crucial point affecting the creation of districts were the politics associated with the supply of infrastructure to district capitals (Jeff Haynes 1991).

'virtually pays for everything' (NEDCo Head of Distribution Unit 2013). Likewise, upon connection households were given a three month grace period before they were requested to pay the first bill. This reinforced the widely-held perception that electricity was supplied by the state for free. Unsurprisingly, the first bill often elicited serious disgruntlement and refusal, or simply inability, to pay due to scarcity of cash. According to NEDCo staff, in electoral campaigns Members of Parliament induced rural dwellers to believe that electricity would be provided for free (NEDCo Head of Public Affairs and Community Relations 2013). MPs also mobilized their Common Funds to acquire the poles needed for the self-help programme, thus perverting the rationale of the scheme, as communities did not provide their due contribution. MPs committed themselves to supply the meters once the communities had been connected, as Eric Opoku, former regional minister and current MP, allegedly failed to do.<sup>27</sup> At the same time, the politicization of the whole scheme offered opportunities for opposition parties. Opposition parties started to mobilize their supporters against projects promoted by rival parties. According to NEDCo commercial staff, this was the case of a big demonstration against the conditions of supply of electricity held in Tamale in 2013 (NEDCo Principal Marketing Officer 2013; NEDCo Tamale Area Commercial Officer 2013). Opposition parties accused NEDCo and, by extension, the government, of malfeasance when prepayment meters were mainstreamed in the mid-2000s. When NEDCo launched a campaign to rollout prepaid meters coinciding with the run-up to the elections of 2012, this issue took centre stage during the campaign. Schemes of electrification became embroiled in the country's territorial politics. As rumour had it local authorities in one area of Brong Ahafo supposedly lobbied to secede from their district to secure a connection to the national grid for the locality, something which, although unheard of, does not appear unlikely to utility staff (NEDCo Principal Marketing Officer 2013). And last but not least, access statistics also became politicized. The government computed (and continues to do so) whole communities as having access to electricity, even though connections only actually reached 20% of the households. As a result, the access rate was (and is) overestimated, as the last national census of 2012 proved. If the official access rate was 72%, the alternative figure computed according

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<sup>27</sup> See <http://citifmonline.com/2017/05/27/nedco-cuts-power-to-over-300-homes-in-asunafo-south/> (accessed May 31, 2017).

to the actual households connected might well be around 60% (Former NED Commercial Manager 2013).

All in all, about a dozen years after the northern electrification component was launched in 1987 the change was huge. President John Mahama expressed it beautifully in an address in 2013: 'The tradition [Simpa, performed at night] that I so enjoyed taking part in as a child has since died out. And all it took was the flick of a switch'.<sup>28</sup> The electrification programme was motivated by various drivers. One driver was the ambition of reducing the northern migrant workers from going to southern Ghana (GEDAP Director 2013). The mobilization of investments in electrification in the north, however, did not originate in a shift in how the region was perceived across political and bureaucratic circles. The "savannah zone" continued by and large to be deemed an "arid" land plagued by dire poverty. Unsurprisingly, in the Vision 2020 planning document of 1996 four of the five mentions of the North portrayed it in a negative light (GoG 1996). Territorial attitudes amidst state bureaucracies remained well entrenched, but the change operated in the provision of infrastructure, notably in electricity supply, was momentous. The change in the calculations of central elites, now wanting to extract narrow electoral rents, proved to be politically far-reaching. The main opposition party would express it less poetically than President Mahama. Adu Boahen, former National Patriotic Party's (NPP) presidential candidate, deprecated these initiatives on the grounds that they were motivated by 'obvious populist and political gains' (cited in Miescher and Tsikata 2010, 34). For the NPP, it was plain that major electrification initiatives had been launched for electoral reasons.

#### **3.4.2. Narrow electoral gains**

The odds of geographical fatalism seemed to condemn the north of Ghana to remain subject to the piecemeal efforts of rural electrification that are so common in many African countries and that, ultimately, barely increase the rates of access. Remoteness from the grid, low population densities across most of its districts, lack of exploitable endowments beyond a few cash crops, as well as pervasive low income levels composed a dire picture for the

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<sup>28</sup> Address by President John Dramani Mahama to open the International Conference on African Studies at the University of Ghana, Accra, October, 24, 2013. Source: <http://www.presidency.gov.gh> (accessed February 6, 2014).

prospects of development in the north. But rather surprisingly, Jerry Rawlings's government decided to put the north on equal footing with the south to attain universal access to electricity in 2020. Stretching over more than two decades, the electrification of the north of Ghana represents one of the relatively rare instances in which an African government has invested considerable economic and political capital in bringing electricity to a region commonly considered part of *l'Afrique inutile*. The analysis that follows attempts to single out the political drivers of that decision. Equally, it tries to find an explanation to how those political drivers shaped the patterns of electrification that unfolded. In keeping with the logic of the research design laid out in the Introduction, the account contrasts two periods of electrification in the north, 1989-2000 and 2000-12. The analysis hints at the persistence of narrow electoral calculations by incumbents in the centre, inviting the reader to see these calculations as the central core-periphery political linkage structuring an "electoral" trajectory of electrification in northern Ghana.

#### **a) Reaching out to the district capitals, 1989-2000**

Throughout the 1990s, calculations about the potential extraction of narrow political gains in the north started to gain traction, trumping or at least rising to the same status as developmental and legitimizing arguments. Narrow calculations translated into accruing votes for the ruling party across northern constituencies. Constituencies in the three regions represent(ed) about one third of voters for presidential elections and, remarkably, an equivalent amount of seats in the national parliament. The second multiparty elections held in 1996 brought into sharp focus how electrification projects could be used to secure votes and seats in distant communities. Local political entrepreneurs found that even the promise of an upcoming line and laying a few wooden poles would do the trick. Electoral processes also synergized with the new politics emerging around the sub-national administrative structures – ie District Assemblies and their Common Funds for development - established by the 1992 Constitution. The electoral results of 1996 came to be confirmed by subsequent electoral processes throughout the 2000s. The search for narrow political considerations became a widely acknowledged fact. This was noted not only by the staff in charge of the NES in the MoE, as noted above. Even the World Bank recognized this in 2007: 'in the past, decisions on which communities to electrify have been subject to political considerations

rather than transparent selection criteria' (World Bank 2007a, 6). Accordingly, the elections of 1996 marked a turning point in the calculations of central elites about the "worth" of the three northern regions. Throughout the eighties and nineties, the perceptions of political leaders about the (lack of) physical and non-physical endowments in the north had, by and large, changed little (GoG 1996). Not surprisingly, public and private interventions continued to be applied to small-scale agriculture and conventional extension policies. By and large, the northernmost regions continued to provide a reservoir of cheap labour for the south, in continuity with the model established under the Colony. By contrast, the 1996 elections made all the more apparent their value as reservoir of votes for the incumbent. Portrayed by some commentators as Rawlings vs the cocoa-growing Ashanti elite, the elections took place after a campaign in which the NDC had made infrastructure provision a major theme.<sup>29</sup> Billboards urging people to cast their votes for the NDC were illustrated with paved roads and electric poles (Briggs 2012; Roberts 1996). Moreover, Rawlings and the NDC succeeded in presenting themselves as the party that had delivered much needed social services, in particular roads, electricity and water to the north and to rural areas in general (Nugent 1999). A similar, strategic use of access to electricity would also appear evident in the 2000 elections, albeit with some degree of innovation, such as the very convenient erection of electric poles immediately beforehand (Nugent 2001).<sup>30</sup> Considering that, for instance, only approximately 50 rural communities were connected to the grid between 1990 and 2000 by the Northern Electrification Project (Briggs 2012), arguments about geographically targeted electoral returns beyond the urban centres of the north need to be taken with a pinch of salt. Undoubtedly, however, the scheme of grid electrification and the SHEP received ample coverage and were insistently mobilized by candidates in the elections, providing ample support for the idea that connections, or simply the likely prospect of being connected some day, had a major impact on voting patterns, and turned the north into a granary of votes for the ruling NDC (André and Mesplé-Somps 2011; Briggs 2012; Trotter 2016). Revealingly, similar moves occurred across a variety of sectors, with swing voters constituting the target of District Assemblies Common Funds and fertilizer subsidies (Banful 2011a, 2011b). The

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<sup>29</sup> As noted by Nugent (2007), invoking the legacy of Nkrumah in education also carries weight politically in the north.

<sup>30</sup> The influence of electricity provision on voting patterns ought not to be exaggerated when compared to the mobilization of long-standing divisions, religious cleavages and disputes about chieftaincy (B. Kelly and Bening 2007) or even in comparison with roads (Harding 2015).

important point here is that the evidence points to the presence of a solid interest amongst political elites to mobilize access to electricity to extract narrow political gains from the mid-1990s to the 2000s. Ultimately, the effects upon northerners of the multiple political intersections between goals of historical redress, developmental aims, electoral strategies and access to electricity can hardly be better conveyed than by their own words: the NDC remains to be, for many, the party that brought “Akosombo” (ie electricity) to the region (Bob-Milliar 2011).

Whether the extraction of narrow electoral gains overlapped with patterns of population density remains an unsettled question. As table 3 above shows, in 2000 access to electricity beyond the urban localities was negligible in the Northern, Upper East and Upper West regions. However, there were significant differences between the rural areas of the three regions. One might expect Upper East, three times more densely populated than Upper West and four times more than the Northern region (see table 1), to show considerably higher rural rates of access. By 2000, however, that was not the case. Even discounting the effects associated to the fact that the national grid arrived slightly later to Bolgatanga (March 1990), Navrongo (August 1990) and Bawku (December 1990) than to Tamale (December 1989), and that the average population density in the region may blur dissimilarities between varying shares of urban and rural densities across the three regions, rural communities in Upper East disproportionately received less from the MoE. This seems to run contrary to the widely accepted notion that Upper East was at the time a stronghold of the NDC, unless it is assumed that extracting narrow electoral rents was meant to target swing voters instead of rewarding core ones. This hypothesis is not inconsistent with the finding of Briggs (2012) who shows that the few communities electrified by the NDC before the 2000 elections were those which had earlier supported the same party in the 1992 elections.

An additional argument in favour of the weight of electoral calculations is that the policy environment of the 1990s did not pose serious barriers to such aspirations. Sectoral policies in the late 1990s were strongly influenced by the general load shedding exercise of 1997-98, caused by the drought that brought down the hydropower production of Akosombo to minimal levels as well as by a withdrawal of investments in generation (Brew-Hammond and Kemausuor 2007). The preoccupations of the government, the World Bank and the IMF revolved around how to meet the growing demand and how to attract funding. In line with the prevailing thinking in the 1990s, such concerns inevitably led sectoral reform to focus on

prescriptions to unbundle generation and introduce more cost-reflective tariffs (Edjekumhene, Amadu, and Brew-Hammond 2001). Little or no attention was paid to the increasing costs incurred by NED due to the expansion of the grid into urban and rural settlements of the north. Indeed, such costs were relatively invisible, as they were subsumed into the overall balance of VRA, in which generation weighed considerably more heavily. The subsuming of the costs of providing electricity to customers in the north into the general budget of VRA effected a *de facto* cross-subsidy from generation to provision in the north. This cross-subsidy was intensified by the fact that no small number of customers in the north were supplied electricity under a flat rate, irrespective of their consumption. Additionally, the inter-sectoral subsidy was also a geographical subsidy from south to north, as most customers paying for the generation costs resided in the south, whereas the distribution side of VRA only supplied households in the three northernmost regions. The combined effect of inattention from sectoral reformers and the subsuming of costs under the VRA's balance sheet was that the substantial operating costs in distribution induced by extending access remained somewhat blurred.

#### **a) Reaching out to the rural districts, 2000-2012**

As the decade of 1990 drew to a close, the administrators of the NES inevitably started to anticipate how the programme's subsequent phase would unfold. At this point, the government considered the NES an outright success. By 2000, all district capitals had been linked to the national grid, and NED had grown to a customer base of 100,000. The ministries with a developmental or social portfolio appreciated the extension of electrification to unserved areas. International donors, notably the World Bank, used the NES to showcase the benefits for Ghana of their cooperation, as long as, international financial institutions invariably remarked, the country also followed sound economic policies. Last but not least, the NES was not only extremely popular in the north of Ghana, but also enjoyed wide support in the southern regions, which recognized the fairness in providing electricity to all Ghanaians, even at a higher cost.

When planning how to implement the second decade of the NES, the administrators in the MoE were confronted with a dilemma: either the NES embarked upon a strategy of aggressive penetration into growingly distant rural areas, spreading out from each and every

electrified district capital, or it sought to first reach the relatively dense pockets of population lying over a limited geographical area close together, whilst at the same time allowing NED to steadily re-balance its customer base by adding more affluent customers, ie well-off households and businesses. Extension, the first strategy of access, would put developmental and, arguably, political calculations at the top. Densification, the second strategy, would situate commercial considerations above other criteria. NES' initial design gave ample latitude to its implementers. Even though the list of communities to be electrified had been specified at NES' inception, with each community subject to a certain timing according to its population and location, nobody in the MoE or the Presidency thought of the initial design of the NES as a rigid blueprint. Moreover, the electrification programme had to be coordinated with the provisions for the utility's daily supply of electricity in the North, as each and every rural household connected by the NES became a NED customer. Overall, in the late 1990s the groundwork was laid for an inescapable choice between a strategy of extension or one of densification.

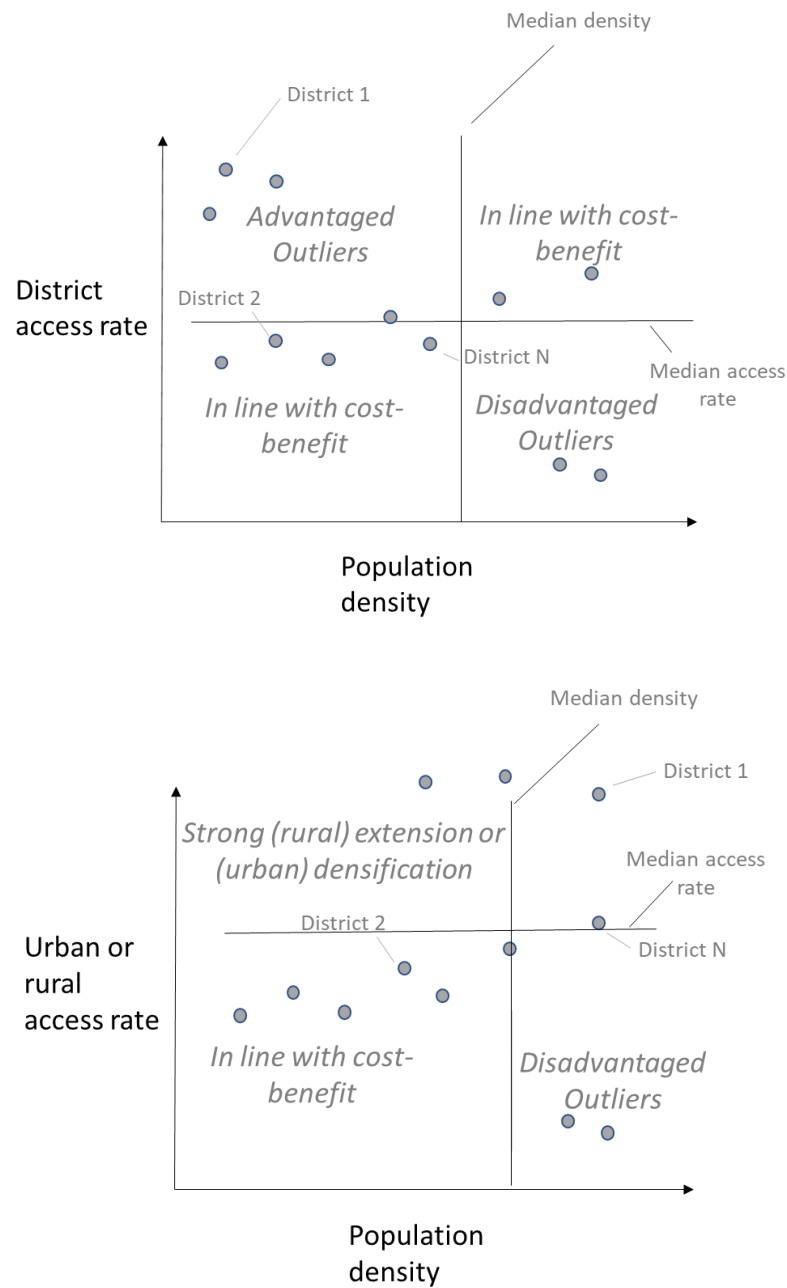
The analysis that follows shows that over the next decade the implementers of the NES opted to pursue a territorial strategy of access that responded in part to legitimacy building aims but also, to a considerable extent, to narrow electoral calculations. Districts with significant urban populations were prioritized, but also distant constituencies for which the commercial and operational case for electrification was weak at best. In some cases, the latter overlapped with electoral districts remarkable for their staunch support – a rarity in the north of Ghana - for the NPP, the incumbent from 2000 to 2008 or for its precarious support for either the NPP or the NDC, the incumbent before and after. At the same time, a few districts closer to the metropolitan areas of Tamale, Bolgatanga and Wa, the three regional capitals, saw substantial densification. All in all, the consequences of this strategy were very positive for access, which spurred across all regions as well as over a relatively large number of districts. In a commendable achievement of policymakers in the MoE, the three northernmost regions of Ghana bridged their gap in access to electricity with the south. Indeed, the quality of access in the North became superior to the service offered by ECG in the south. On the contrary, the consequences of a strategy still leaning heavily on rural extension were not so positive for the utility, NED. Rural extension pushed NED's balance sheet increasingly closer to the edge (see chapter 5). At this stage, suffice to say that this situation was only made sustainable by



an extremely beneficial organizational setup that allowed NED to conceal its red numbers under its umbrella utility, VRA.

The analysis below looks at the evolution of the rates of rural, urban and total electrification across all districts of the Northern, Upper East and Upper West regions (see figures 10 to 18). To that end, it draws upon techniques of exploratory data analysis (Anselin 1994; Anselin and Getis 1992) and, in particular, in outlier analysis (Andrienko and Andrienko 2006; Xie et al. 2017). The analysis proceeds in two steps. Firstly, the study compares the evolution in access rates with the density of population and the area of each district. The distribution of population densities over the north of Ghana is shown in map 5 in the Appendixes. Higher densities are not only indicative of a higher cost-benefit ratio for any given investment in electrification, but they also suggest a commercial case for the utility's subsequent routine provision. Accordingly, investing in access in low density districts often points to "deviant" cases that are not in line either with a logic of cost-benefit or with a logic of subsequent commercial operation. This analysis serves two purposes: identifying outlier districts that do not follow a cost-benefit rationale and characterizing the spatial strategy applied in each district, ie rural extension or urban densification, or a combination of both. Outlier districts and spatial strategies are identified in keeping with the rationale in figure 9. The figure employs a scatter plot to display the relation between density and access rates (aggregate, rural or urban). Outlier districts are identified according to a simple quadrant analysis, in which the boundaries of each quadrant are determined by the median values of population density and the access rate (aggregate, rural or urban, depending on the type of analysis). Data for access rates is drawn from the 2010 national census. The national census proxied access to electricity from the mains by asking respondents about the main source of lighting in the household (GSS 2012).

**Figure 9: Rationale for identification of outlier districts, and strategies of (strong) extension and/or densification.**

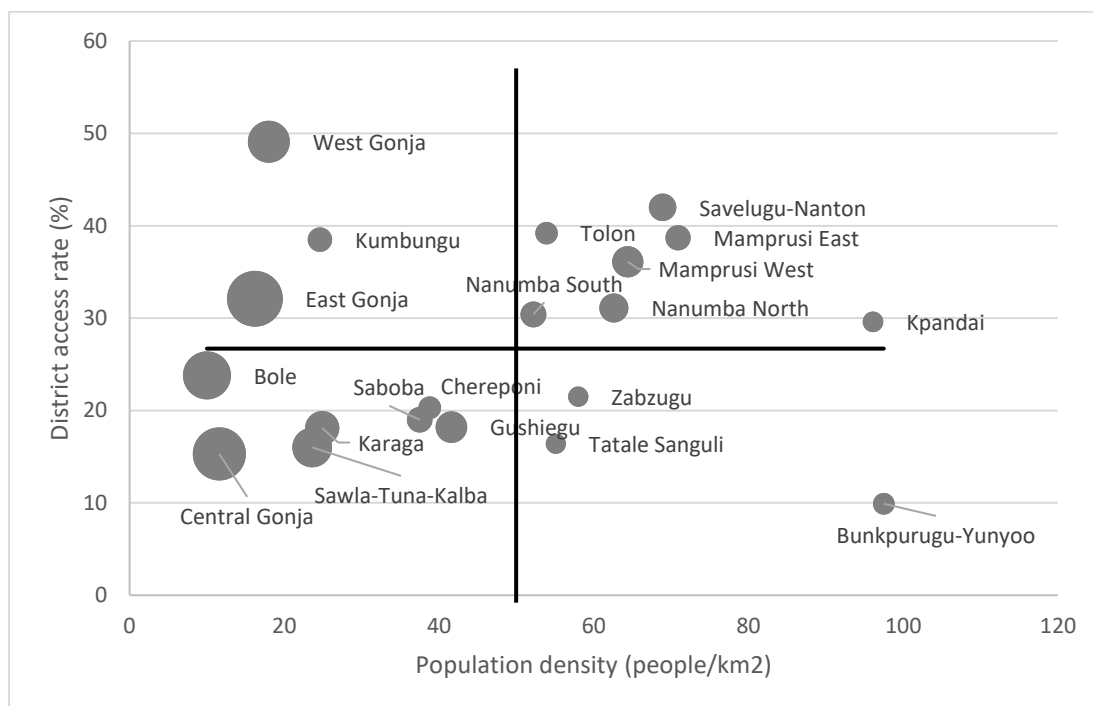


**Source: Own elaboration.**

Secondly, the analysis below looks at potential connections between outlier districts and narrow electoral gains for the incumbent in Accra. To identify electoral interests, tables 11

to 16 below show the party that carried each electoral constituency in the series of parliamentary and presidential elections of 2000, 2004 and 2008. Bear in mind that electoral constituencies and districts do not always coincide, as some districts are home to more than one electoral constituency. Still, as the lowest level of disaggregation of rates of access to electricity is the district, the district is used as the unit of comparison. Map 6 in the Appendixes provides a map of the districts in the three regions of the north of Ghana between February 2008 and June 2012.<sup>31</sup>

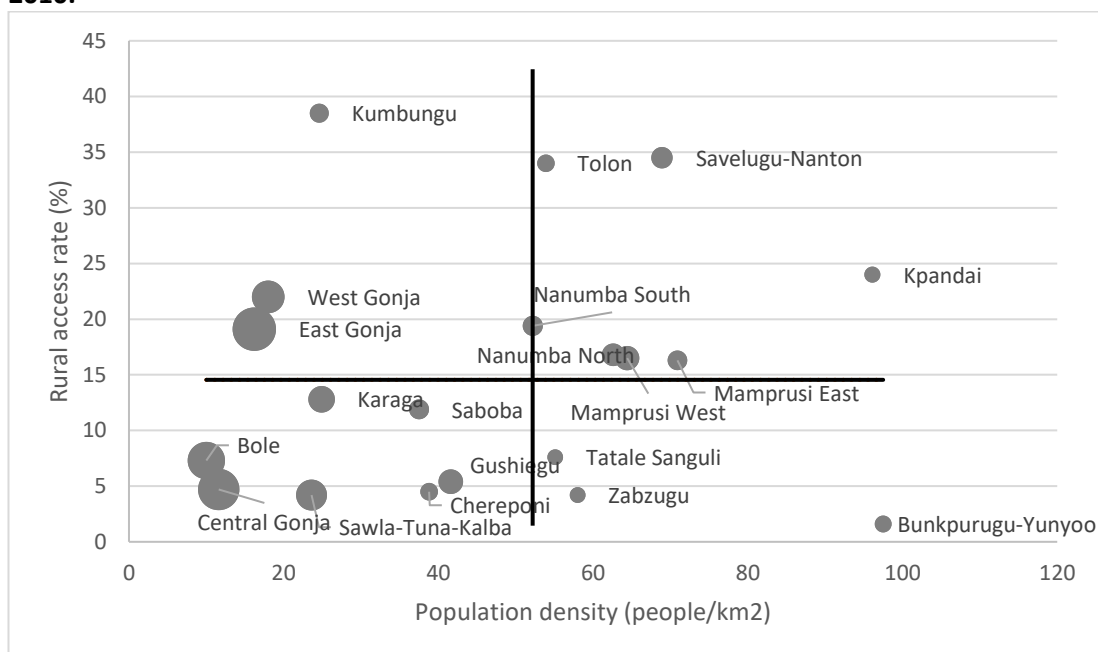
**Figure 10: Rates of access to electricity by district vs. population density, Northern region, 2010.**



**Source: Ghana Statistical Service reports. Note: Size of each point is proportional to district area.**

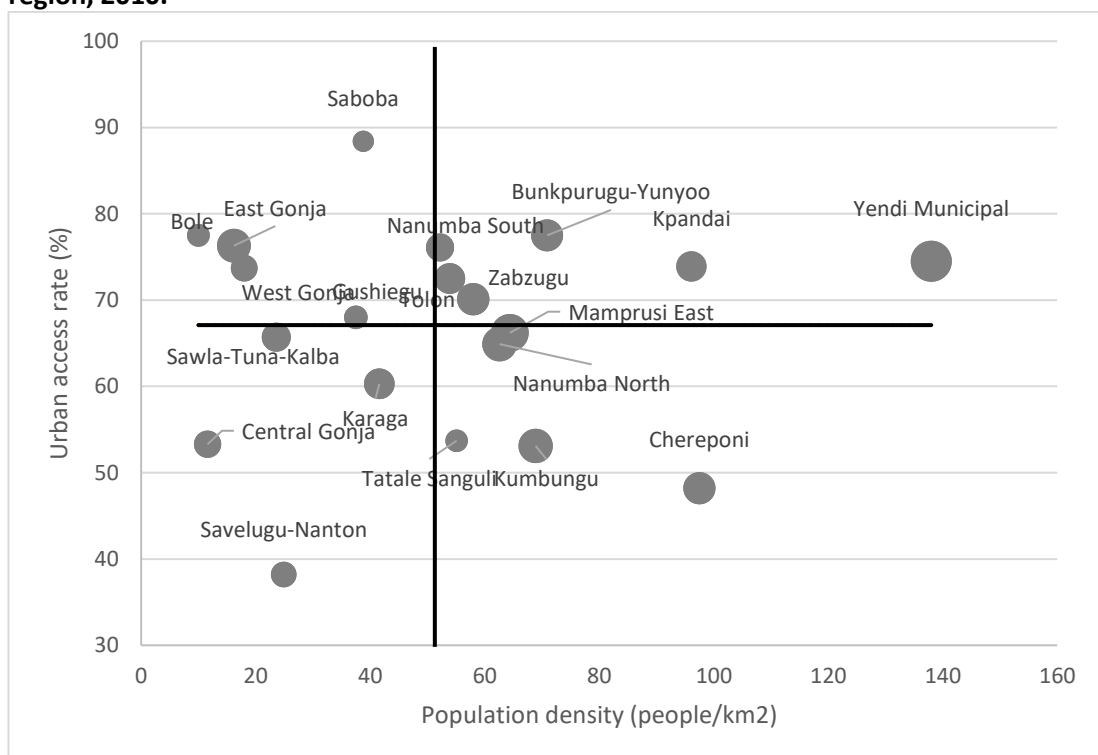
<sup>31</sup> On June 28, 2012, 46 new districts were created, bringing the total in Ghana to 216. The previous round of creation of districts occurred in February 2008. The Northern Region was divided into 23 districts (including metropolitans and municipalities), and Upper East and Upper West into nine each.

**Figure 11: Rural access to electricity vs. population density by district, Northern region, 2010.**



Source: Ghana Statistical Service reports. Note: Size of each point is proportional to district area.

**Figure 12: Rates of urban access to electricity vs. population density by district, Northern region, 2010.**



Source: Ghana Statistical Service reports. Note: Size of each point is proportional to district population. Eminently rural districts (urban access rate=0) are not represented.

**Table 11: Winner by electoral constituency, Northern region, 2000-08.**

|    |                   |                   | Parliamentary elections |       |       | Presidential elections |      |      |
|----|-------------------|-------------------|-------------------------|-------|-------|------------------------|------|------|
|    | Constituency      | District          | 2000                    | 2004  | 2008  | 2000                   | 2004 | 2008 |
| 1  | Bimbilla          | Nanumba North     | NDC                     | NDC   | NPP   | NDC                    | NDC  | NPP  |
| 2  | Bole              | Bole              | NDC                     | NDC   | NDC   | NDC                    | NDC  | NDC  |
| 3  | Buipe/Yapei       | Central Gonja     | NDC                     | NPP   | NDC   | NDC                    | NPP  | NDC  |
| 4  | Bunkpurugu-Yunyoo | Bunkpurugu-Yunyoo | NDC                     | INDEP | NDC   | NDC                    | NDC  | NDC  |
| 5  | Chereponi         | Saboba-Chereponi  | NDC                     | NPP   | NPP   | NDC                    | NPP  | NPP  |
| 6  | Damango           | West Gonja        | NPP                     | NPP   | NPP   | NDC                    | NDC  | NDC  |
| 7  | Gushegu           | Gushegu           | NDC                     | NPP   | NDC   | NDC                    | NPP  | NDC  |
| 8  | Karaga            | Karaga            |                         | NDC   | NDC   |                        | NDC  | NDC  |
| 9  | Kpandai           | Kpandai           | NDC                     | NDC   | NDC   | NDC                    | NDC  | NDC  |
| 10 | Kumbungu          | Tolon-Kumbungu    | NDC                     | NDC   | NDC   | NDC                    | NDC  | NDC  |
| 11 | Mion              | Yendi             | NDC                     | NDC   | NDC   | NDC                    | NDC  | NDC  |
| 12 | Nalerigu          | Mamprusi East     | PNC                     | NPP   | NDC   | NDC                    | NDC  | NDC  |
| 13 | Nanton            | Savelugu-Nanton   | NDC                     | NDC   | NDC   | NDC                    | NDC  | NDC  |
| 14 | Saboba            | Saboba-Chereponi  | NDC                     | NPP   | NDC   | NDC                    | NPP  | NDC  |
| 15 | Salaga            | East Gonja        | INDEP                   | NPP   | NDC   | NDC                    | NDC  | NDC  |
| 16 | Savelugu          | Savelugu-Nanton   | NDC                     | NDC   | NDC   | NDC                    | NDC  | NDC  |
| 17 | Sawla-Tuna-Kalba  | Sawla-Tuna-Kalba  | NDC                     | NDC   | NDC   | NDC                    | NDC  | NDC  |
| 18 | Tamale Central    | Tamale Metro.     | NDC                     | NDC   | NDC   | ---                    | NDC  | NDC  |
| 19 | Tamale North      | Tamale Metro.     | --                      | NDC   | NDC   | ---                    | NDC  | NDC  |
| 20 | Tamale South      | Tamale Metro.     | --                      | NDC   | NDC   | ---                    | NDC  | NDC  |
| 21 | Tolon             | Tolon-Kunbungu    | NDC                     | NDC   | NDC   | NDC                    | ---  | NDC  |
| 22 | Walewale          | Mamprusi West     | PNC                     | NDC   | NDC   | NDC                    | NDC  | NDC  |
| 23 | Wulensi           | Nanumba South     | NDC                     | NPP   | INDEP | NDC                    | NDC  | NPP  |
| 24 | Yagaba Kubori     | Mamprusi West     | ---                     | NDC   | NDC   | ---                    | NDC  | NDC  |
| 25 | Yendi             | Yendi             | NPP                     | NPP   | NDC   | NPP                    | NPP  | NPP  |
| 26 | Zabzugu-Tatale    | Zabzugu-Tatale    | NDC                     | NDC   | NPP   | NDC                    | ---  | NPP  |

Source: PeaceFM Online.<sup>32</sup><sup>32</sup> Source: <http://ghanaelections.peacefmonline.com/> (accessed May 11, 2017).

**Table 12: Outlier districts in the Northern region, according to dominant electrification pattern, density, size, distance to the national grid, policy outcome and electoral status.**

| District          | Dominant pattern                         | Density | Size | Distance to the national grid | Policy outcome            | Electoral status                    |
|-------------------|--|---------|------|-------------------------------|---------------------------|-------------------------------------|
| West Gonja        | Moderate extension and densification     | L       | H    | H                             | Strongly favoured         | NPP Parl. stronghold                |
| Chereponi         | Strong densification                     | L       | M    | H                             | Strongly favoured         | NPP stronghold                      |
| Nanumba South     | Moderate extension, strong densification | M       | M    | L                             | Moderately favoured       | Swing district                      |
| Kumbungu          | Strong extension                         | L       | L    | L                             | Moderately favoured       | NDC stronghold                      |
| East Gonja        | Moderate extension, strong densification | L       | H    | L                             | Moderately favoured       | Swing district                      |
| Tolon             | Strong extension                         | M       | L    | L                             | Moderately favoured       | NDC stronghold                      |
| Yendi Municipal   | Weak extension, strong densification     | H       | L    | L                             | Moderately favoured       | Mixed: urban pro-NPP, rural pro-NDC |
| Savelugu-Nanton   | Strong extension                         | H       | L    | L                             | In line with cost-benefit | NDC stronghold                      |
| Mamprusi East     | Moderate extension, urban densification  | H       | L    | H                             | In line with cost-benefit | Swing district                      |
| Bunkpurugu-Yunyoo | Weak extension and densification         | H       | L    | H                             | Strongly disadvantaged    | NDC stronghold                      |

**Source: Own elaboration. Note: Codes H, M and L are High, Medium, and Low.**

The analysis of district access rates, population density and size of district yields very interesting results. In the Northern region, it reveals the presence of ten outlier districts that feature unusually high or low in electrification rates according to their population density. A more detailed analysis is summarized in table 12, which includes not only density and size, but also distance to the 33-kV high-voltage trunk grid. Districts far from the high-voltage grid are assumed to be costlier to electrify. The table characterizes to what extent each outlier district was advantaged or disadvantaged. From the ten initial candidates, the dominant

patterns of electrification in Savelugu-Nanton and Mamprusi East are found to respond to a cost-benefit rationale. In Savelugu-Nanton, rural extension was pursued more forcefully than urban densification, but this pattern squares well with a dense and relatively small district cut across by the 66-kV national grid on its way to Boltaganga. Similarly, Mamprusi East, where extension and densification were balanced, is a dense and relatively small district, but lies at a certain distance from the 33-kV grid. The same dominant pattern can be observed in West Gonja. In this case, however, the district was strongly favoured, given its low density, big size and distance to the grid. Chereponi also received a disproportionate amount of attention, considering its low density, medium size and distance to the then existing grid. An additional five districts were paid a milder yet still effective attention from the policymakers in the MoE, namely Nanumba South, Kumbungu, East Gonja, Tolon and Yendi Municipal, despite their low or medium population densities. Three of them were subject to aggressive rural extension, and two were intensively densified. Lastly, Bunkpurugu-Yunyoo was strongly disadvantaged, despite being dense and small. All in all, between 2000 and 2010 eight of the twenty districts in the region, a considerable proportion, deviated from the arguably rationale and cost-efficient strategy of concentrating electrification in dense, small and proximate districts. Moreover, the dominant pattern of electrification across the different districts varied remarkably. In some districts, rural extension was pursued aggressively; in others, urban densification prevailed. In another set of districts the pattern was more balanced, or, conversely, did not bring about any substantial progress in access. Taking the outliers and the more orthodox districts lying closer to the trend line represented in the figures together, the overall pattern in the Northern region between 2000 and 2010 saw the densification of the urban districts of Tamale and Yendi, as well as the extension of the grid over rural areas in the districts surrounding the regional capital in a pattern that squares well with the map of densities reproduced in the appendixes. At the same time, however, the grid was also extended to particularly inauspicious districts due to their density, size and location.

The contrast with the prevailing patterns in the elections of 2000, 2004 and 2008 sheds some light on the potential extra-developmental motivations for the patterns described in the previous paragraph. Strikingly, one of the two districts that were more strongly favoured turn out to also be strongholds of the incumbent NPP in the national government (2000-08) (see

table 11).<sup>33</sup> Indeed, Chereponi delivered a victory for the NPP in both parliamentary and presidential elections in 2004 and 2008 but the second most favoured district, West Gonja, was carried by the NPP in the three consecutive parliamentary elections of 2000, 2004 and 2008 (nonetheless, in the presidential elections the district voted for the NDC). The fact that two districts solidly voting for the NPP feature at the top of the districts most privileged by electrification is a statistical rarity, given that there are only three NPP strongholds in the region. Moreover, amongst the five districts that were moderately favoured, two were swing districts. In that period, there were eight swing districts. Last but not least, the district that was most disfavoured, Bunkpurugu-Yunyoo, was a NDC stronghold, as was also the case of the rural part of the Yendi district. Interestingly, the urban part of Yendi was nonetheless subject to intensive densification. In contrast to the rural part of the district, the urban constituency is a NPP stronghold.<sup>34</sup>

In Upper East, the overall pattern was more neatly aligned with a cost-benefit analysis (see figures 13, 14 and 15 and tables 13 and 14). This is hardly surprising, given that the region is host to the highest population densities across the north of Ghana and, therefore, an auspicious terrain for more commercial strategies. According to the same analysis, four of the eleven districts in the region were moderately favoured by projects of electrification regardless of their geographic and demographic conditions. Builsa North, Pusiga, Bongo and Garu Tempane benefitted from a positive bias, whereas the rest of the districts were in line with cost-benefit calculations. Interestingly, only one district was punished Bongo, which is somewhat striking given that the region is widely considered to be one of the most solid strongholds of the NDC in Ghana. Indeed, the overall pattern in the region abode by a predictable emphasis on densification in the most populated areas of Bolgatanga and Bawku, aggressive rural extension to the nearby districts of Pusiga and Builsa North, moderate rural extension in Kasena Nankana East, and little extension across Bongo, despite its high density. Extension and densification were more balanced across the districts of the region than in

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<sup>33</sup> Strongholds in this context are districts where one party carried at least four elections, presidential or parliamentary, between 2000 and 2008. swing districts are those that have awarded an electoral victory to the non-dominant party at least twice between 2004 and 2008, considering both parliamentary and presidential elections.

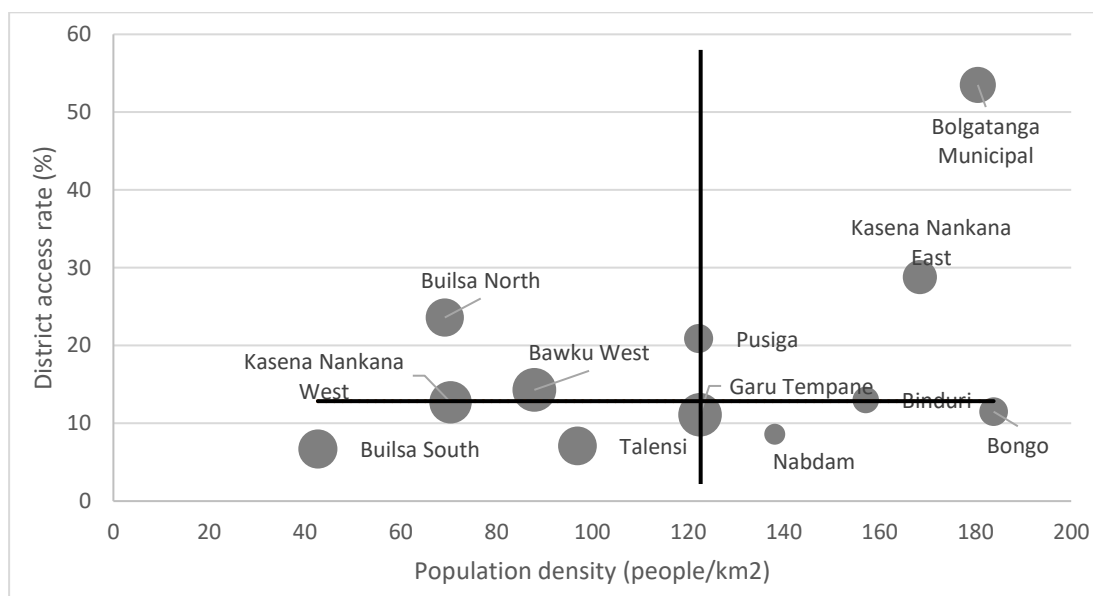
<sup>34</sup> Yendi district is not represented in the figures of district and rural access, as its very high density completely distorts the graph. Its access rate in 2010 was only 40.3%, unusually low for the second most populated city in the Northern region. For the same reason, Tamale Metropolitan is not represented in the figures.



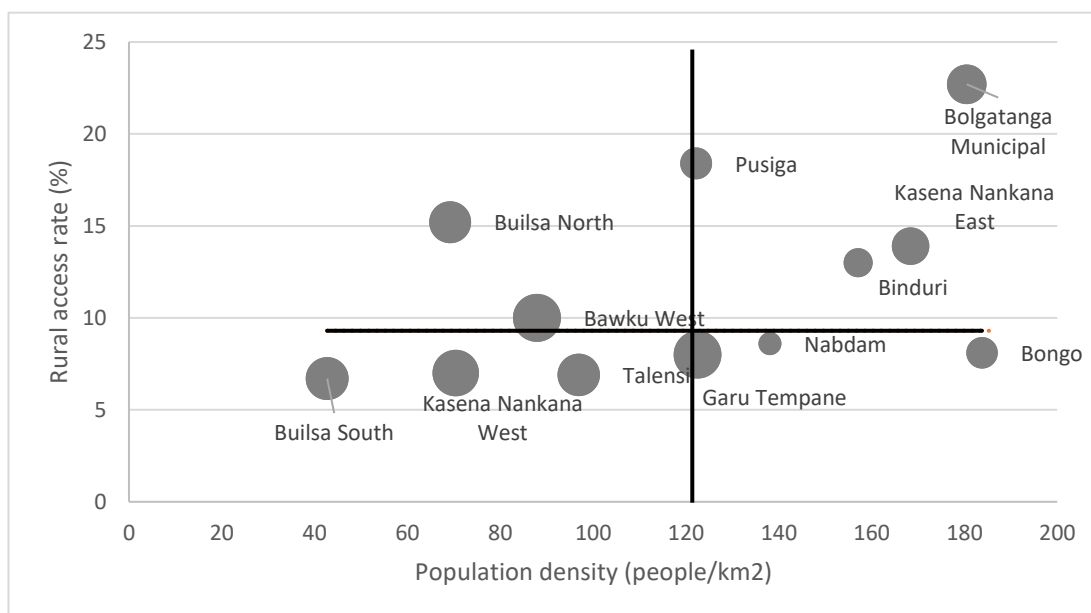
Northern, which can again be cogently attributed to the prevailing demographic profile of Upper East.

The potential influence of the search for electoral gains in Upper East is difficult to establish. Bawku Municipal and Kasena Nankana East, the two NPP strongholds in Upper East, benefitted from electrification rates above the average, but such efforts were in line with their geographical and demographic endowments. The NDC strongholds were not particularly subject to discrimination either, or at least the pattern is not evident at first glance from the analysis of the rates of district, urban and rural electrification. Overall, then, Upper East appears to be less subject to electoral influences than the Northern Region, possibly because of the much higher population densities of the districts of the former.

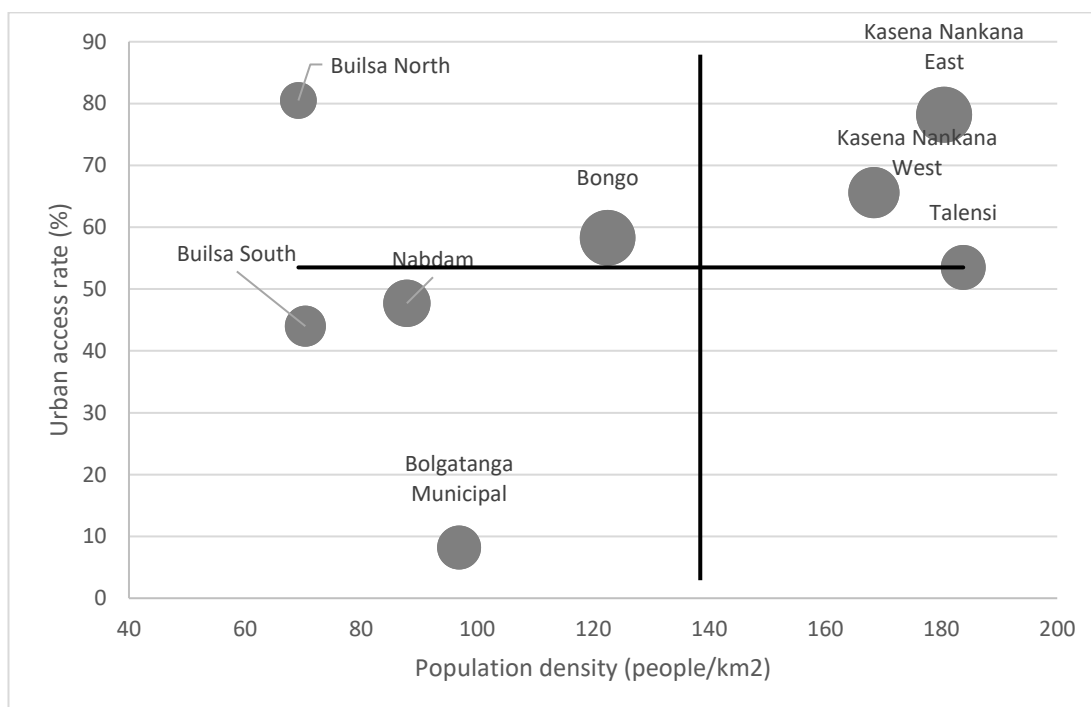
**Figure 13: District access to electricity vs. population density, Upper East, 2010.**



**Source: Ghana Statistical Service reports. Note: Size of each point is proportional to district area.**

**Figure 14: Rural access to electricity vs. population density by district, Upper East, 2010.**

Source: Ghana Statistical Service reports. Note: Size of each point is proportional to district area.

**Figure 15: Rates of urban access to electricity vs. population density by district, Upper East, 2010.**

Source: Ghana Statistical Service reports. Note: Size of each point is proportional to district population. Eminently rural districts (urban access rate=0) are not represented.

**Table 13: Winner by electoral constituency, Upper East region, 2000-08.**

|    | Constituency         | District            | Parliamentary elections |      |      | Presidential elections |      |      |
|----|----------------------|---------------------|-------------------------|------|------|------------------------|------|------|
|    |                      |                     | 2000                    | 2004 | 2008 | 2000                   | 2004 | 2008 |
| 1  | Bawku Central        | Bawku Municipal     | NPP                     | NDC  | NPP  | NDC                    | NDC  | NPP  |
| 2  | Binduri              | Bawku Municipal     | NDC                     | NDC  | NPP  | NDC                    | NDC  | NDC  |
| 3  | Bolgatanga Municipal | Bolgatanga          | PNC                     | PNC  | NDC  | NDC                    | NDC  | NDC  |
| 4  | Bongo                | Bongo               | NDC                     | NDC  | NDC  | NDC                    | NDC  | NDC  |
| 5  | Builsa North         | Builsa              | NDC                     | NPP  | NDC  | NDC                    | NDC  | NDC  |
| 6  | Builsa South         | Builsa              | NDC                     | NDC  | PNC  | NDC                    | NDC  | NDC  |
| 7  | Chiana/Paga          | Kasena Nankana West | NDC                     | NDC  | NDC  | NDC                    | NDC  | NDC  |
| 8  | Garu-Tempane         | Garu-Tempane        | INDEP                   | NDC  | NDC  | NDC                    | NDC  | NDC  |
| 9  | Nabdam               | Talensi-Nabdam      | NDC                     | NDC  | NDC  | NDC                    | NDC  | NDC  |
| 10 | Navrongo             | Kasena Nankana East | NPP                     | NPP  | NDC  | NPP                    | NPP  | NDC  |
| 11 | Pusiga               | Bawku Municipal     | ---                     | NDC  | NDC  | ---                    | NDC  | NDC  |
| 12 | Talensi              | Talensi-Nabdam      | NDC                     | NDC  | NDC  | NDC                    | NDC  | NDC  |
| 13 | Zebilla              | Bawku West          | NDC                     | PNC  | NDC  | NDC                    | NDC  | NDC  |

Source: PeaceFM Online.

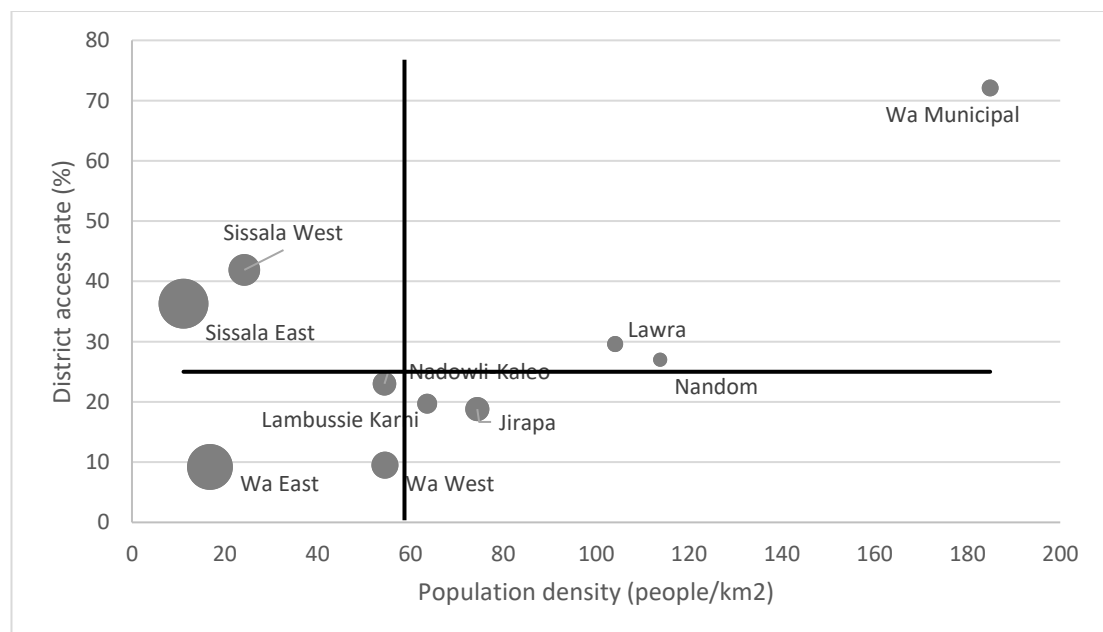
**Table 14: Outlier districts in the Upper East region, according to dominant electrification pattern, density, size, distance to the national grid, policy outcome and electoral status.**

| District             | Dominant pattern                       | Density | Size | Distance to the national grid | Policy outcome            | Electoral status |
|----------------------|--|---------|------|-------------------------------|---------------------------|------------------|
| Builsa North         | Strong extension and densification     | M       | M    | M                             | Moderately advantaged     | NDC stronghold   |
| Pusiga               | Strong extension                       | M       | L    | L                             | Moderately advantaged     | NDC stronghold   |
| Garu Tempane         | Strong densification                   | M       | L    | M                             | Moderately advantaged     | NDC stronghold   |
| Bolgatanga Municipal | Strong extension and densification     | H       | L    | L                             | In line with cost-benefit | NDC stronghold   |
| Bawku Municipal      | Strong densification                   | H       | L    | L                             | In line with cost-benefit | NPP stronghold   |
| Bongo                | Weak extension, moderate densification | H       | M    | M                             | Moderately disadvantaged  | NDC stronghold   |

Source: Own elaboration.

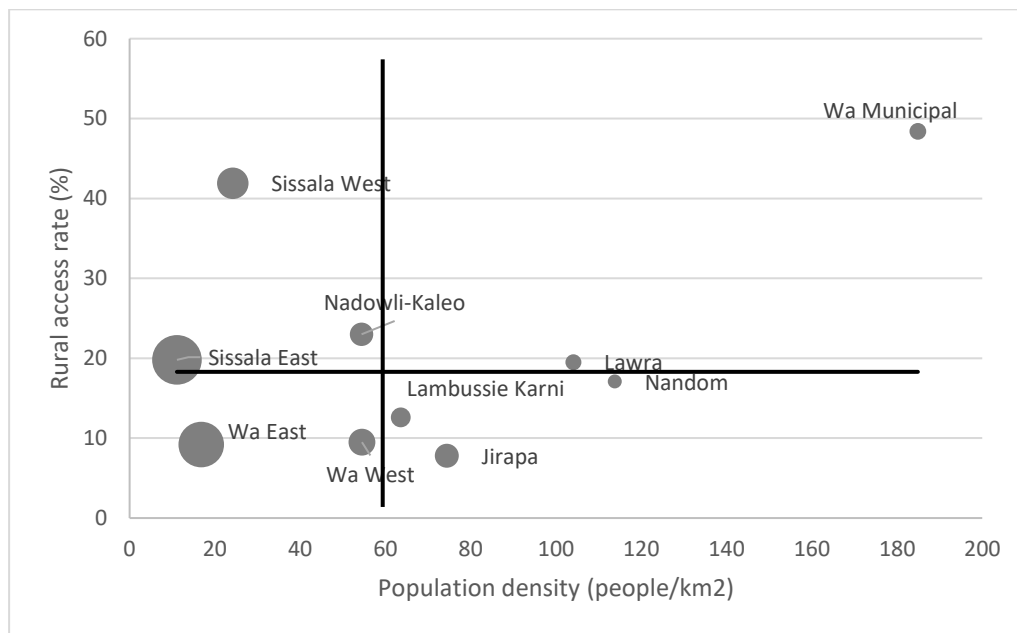
Finally, in Upper West the dominant district patterns between 2000 and 2010 considerably diverged from what cost-efficiency calculations might suggest (see figures 16, 17 and 18 and tables 15 and 16). Two districts, namely Sissala East and West, were strongly favoured by the electrification policies, despite their low densities, large surface areas and distance to the trunk of the grid, which in Upper West runs along a South-North line in parallel, and relatively close, to the border with Ivory Coast. Two more districts were also moderately advantaged, Lawra and Nandom, with an emphasis on urban densification, despite their moderate densities and, again, relative distance from the national grid. In addition, Wa Municipal saw not only an effort in densification but also in rural extension. Tellingly, no district was penalized. The overall pattern, therefore, is patchy. In two districts in the distant northwestern corner of the region, rural extension was pursued with intensity, particularly in Sissala West; Wa and two other districts, by contrast, saw a huge amount of urban densification. Interestingly, both Wa and Sissala voted repeatedly for the incumbent NPP, in an otherwise strongly NDC-leaning region.

**Figure 16: Access to electricity vs. population density by district, Upper West, 2010.**



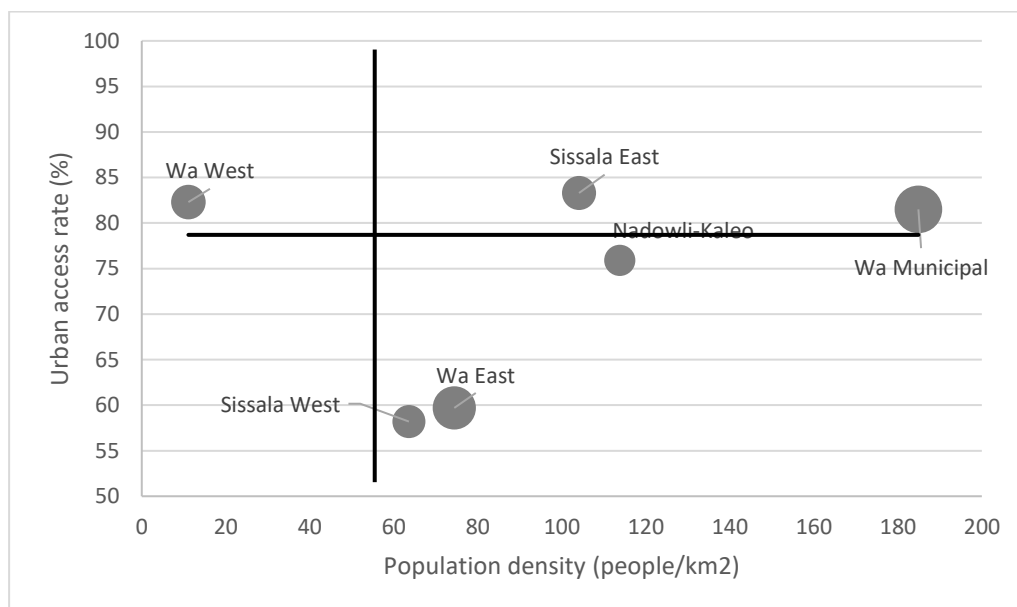
**Source:** Ghana Statistical Service reports. **Note:** Size of each point is proportional to district area. Daffiama-Bussie-Issa is not represented due to lack of disaggregated data.

**Figure 17: Rural access to electricity vs. population density by district, Upper West, 2010.**



Source: Ghana Statistical Service reports. Note: Size of each point is proportional to district area.

**Figure 18: Urban access to electricity vs. population density by district, Upper West, 2010.**



Source: Ghana Statistical Service reports. Note: Size of each point is proportional to district population. Eminently rural districts (urban access rate=0) are not represented.

**Table 15: Winner by constituency, Upper West region, 2000-08.**

|    | Constituency              | District     | Parliamentary elections |      |      | Presidential elections |      |      |
|----|---------------------------|--------------|-------------------------|------|------|------------------------|------|------|
|    |                           |              | 2000                    | 2004 | 2008 | 2000                   | 2004 | 2008 |
| 1  | Daffiama-Bussie-Issa      | Nadowli      | --                      | NDC  | NDC  | ---                    | NDC  | NDC  |
| 2  | Jirapa                    | Jirapa       | NDC                     | NDC  | NDC  | NDC                    | NDC  | NDC  |
| 3  | Lambussie Karni           | Lambussie    | NDC                     | NDC  | NPP  | NDC                    | NDC  | NPP  |
| 4  | Lawra-Nandom              | Lawra        | NDC                     | NDC  | NPP  | NDC                    | NDC  | NDC  |
| 5  | Nadowli Kaleo (East/West) | Nadowli      | NDC                     | NDC  | NDC  | NDC                    | NDC  | NDC  |
| 6  | Sissala East              | Sissala East | PNC                     | PNC  | NDC  | NPP                    | NPP  | NPP  |
| 7  | Sissala West              | Sissala West |                         | PNC  | PNC  |                        | NDC  | NDC  |
| 8  | Wa East                   | Wa East      | NDC                     | NPP  | NPP  | NDC                    | NPP  | NPP  |
| 9  | Wa Municipal              | Wa Central   | NDC                     | NDC  | NDC  | NDC                    | NDC  | NDC  |
| 10 | Wa West                   | Wa West      |                         | NDC  | NDC  |                        | NDC  | NDC  |

Source: PeaceFM Online.

**Table 16: Outlier districts in the Upper West region, according to dominant electrification pattern, density, size, distance to the national grid, policy outcome and electoral status.**

| District     | Dominant pattern                   | Density | Size | Distance to the national grid | Policy outcome            | Electoral status |
|--------------|------------------------------------|---------|------|-------------------------------|---------------------------|------------------|
| Sissala East | Strong densification               | L       | L    | H                             | Strongly advantaged       | Swing district   |
| Sissala West | Strong extension                   | L       | L    | H                             | Strongly advantaged       | Swing district   |
| Lawra        | Strong densification               | M       | M    | H                             | Moderately advantaged     | NDC stronghold   |
| Nandom       | Strong densification               | M       | L    | H                             | Moderately advantaged     | NDC stronghold   |
| Wa Municipal | Strong extension and densification | H       | L    | L                             | In line with cost-benefit | NDC stronghold   |

Source: Own elaboration.

The connections between electoral patterns and district electrification extension vs. densification, are illuminating. The analysis reveals how no single spatial strategy (rural grid extension or urban densification) prevailed across the North. Even within the regions, no single strategy was consistently implemented. Upper East nonetheless fits better with the ideal of cost-efficiency analysis, as urban densification was pursued across its two major urban centres (a strategy in line with its smaller size and higher population densities). The analysis also shows how a few deviant cases, favoured by electrification projects, overlap with electoral constituencies where the governing party from 2000 to 2008 returned MPs or majorities in presidential elections. These two insights can only be taken as tentative. After all, prosaic factors such as the presence of an energetic district manager in the utility may explain higher access rates more than vague connections between grid topologies and electoral returns. Even so, the picture that emerges in the spatial configuration of access in the period between 2000 and 2008 points to more than strictly technical and economic calculations.

Overall, legitimizing claims remained a constant throughout the electrification scheme, but were particularly relevant in the inaugurational period until 2000. The defeat of the NDC in 2000 undoubtedly contributed to diminish the weight of legitimizing narratives, given that the programme was the brainchild of the outgoing party. If narrow electoral calculations had been acute under the rule of NDC, they were apparently eagerly adopted by the NPP administration, which in the 2000-2008 period followed a mixed strategy of targeting swing districts and rewarding some loyal constituencies. The fact that those sub-national units include a non-negligible number of sparsely populated districts (ie Chereponi, Nanumba South, Kumbungu, Tolon or Sissala West) also speaks in favour of electoral calculations and to the relative secondary role of legitimizing aims, particularly after 2000. Given that the most recurrent legitimizing discursive trope was the ministerial announcement of yet another increase in the access rate, it would have made little sense to electrify sparsely populated districts (which would contribute little to the access rate) unless as a result of parallel electoral calculations. This speaks to the complex interactions between narrow electoral gains and legitimacy building, and how both may reinforce each other or pull in opposite directions according to broader socio-political factors.

The former does not imply that the argument in favour of narrow electoral gains is not in need of further refinement. One weakness that remains unaddressed concerns the

differences in the intensity of electrification between the three northern regions. Owing to the electrification rates per region, and to the share of SHEP projects in each of them, it is surprising that the Northern Region was relatively “bypassed” and that Upper East received a disproportionate percentage of interventions. Higher population densities in Upper East can only partially account for the phenomenon, as there are significant disparities in density between the urban, ie Bolgatanga, Navrongo and Bawku, and the rural areas. Another more fundamental shortcoming of the electoral argument is the failure to distinguish between presidential and parliamentary elections. Accruing votes does not require extending electricity provision beyond Tamale, Sunyani, Techiman and probably Bolgatanga, which together represent a large share of total votes in the north. Extension beyond urban areas makes more sense for parliamentary elections. Yet, overall, a strong argument in favour of the electoral case is provided by the significant alterations in the geographical priorities for electrification after the alternances in power in 2000 and 2008.

### **3.5. Conclusion**

This chapter set out to explore the plausibility of narrow electoral calculations as a driver of territorial strategies of electrification in northern Ghana. The analysis has reconstructed the evolution of electrification in two periods: 1989-2000, which extended the transmission grid toward the North, as well as the connection to the national grid of all district capitals; and 2000-2012, which extended the grid toward rural communities from district capitals and densified the grid in major urban settlements. The analysis has also offered a visual representation of the territorial strategies of electrification for each of the three northern regions, along axes with extension at one end, and densification at the other end. Lastly, this chapter has analysed in detail the connections between territorial strategies of access to electricity and the electoral gains of incumbents. It disclosed a pattern which favoured the incumbent NDC before 2000, as well as the incumbent NPP from 2000 to 2008 precisely in a handful of chief swing and stronghold districts. The potential connection between votes and electrification is more compelling as it is supported by key informants in the electricity sector.



The conclusions beg some caution, though. We must put forth two qualifications before connecting electrification patterns with electoral core-periphery political linkages. The first is the difficulty of disentangling electoral calculations and legitimacy building as the sole driver of electrification. Legitimacy building is invariably present as a major force behind large developmental schemes. In the case of long-neglected peripheries, historical redress acts as a major driver for electrification. Furthermore, historical redress and legitimacy building are closely entwined. Problematically for the analysis in this chapter, the territorial patterns that electoral and legitimacy drivers may produce overlap, as both often depart from pure efficiency calculations in the design of electrification programmes. The second limitation is that northern Ghana may not necessarily be representative of comparable trajectories of peripheral electrification structured by electoral calculations. It is impossible to tell at this stage, particularly in the African context, whether northern Ghana shares fundamental traits with other trajectories of “electoral electrification” or not. Therefore, the territorial outcomes and strategies presented in this chapter ought to be taken as unique, in want of further comparison with cognate sequences of peripheral electrification in other contexts.

The evolution of the programme of electrification in the North from a strong emphasis on rural extension towards an increasing incorporation of urban densification is confirmed by the events that occurred after 2012 (that fall beyond the scope of this chapter, and possibly hint to a distinct third phase of electrification). This evolution is driven not only by cost-benefit analyses but also by sectoral pressure to attain the financial sustainability of the electric regime in Ghana. The most important events were the two power crises that hit Ghana between 2013 and 2016 (L. M. MacLean et al. 2016). The first minor crisis took place in 2013 and put the electrification programme under fire. In a country ravaged by recurrent power rationing, a World Bank senior official commented that, “Ghana’s rural electrification programme is insane.”<sup>35</sup> The power shortages that started in 2014 and continued until early 2016 were more intense and became a major locus of political contention between the government and the opposition. In addition, the dismal state of Ghana’s public accounts forced the government to seek the assistance of the World Bank, the IMF and the United States government. The latter, represented by its Millennium Challenge Corporation, signed a Ghana Power Compact with Ghana that envisaged far-reaching reforms in the management

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<sup>35</sup> See <https://www.ghanabusinessnews.com/2013/04/15/ghanas-rural-electrification-programme-is-insane-world-bank-official/> (accessed May 12, 2017).

of the ECG, including outsourcing administration to a private company. Most importantly for this analysis, the Ghana Power Compact also considered NED's financial sustainability for the first time (after 2012 NEDCo, an autonomous distribution utility) as a goal on equal footing with the sustainability of ECG. The inclusion of NEDCo's recurrent losses as a major policy concern marked a departure from the prevailing settlement in Ghana's electric regime. It is likely that the latter has also ushered in a new phase in territorial strategies of electrification, including a drift towards more densification and less rural extension.

Even with the caveats above, the implications of the findings in this chapter are manifold. Northern Ghana provides an instance in which electoral calculations seemingly structure the delivery of access to electricity towards aligned territorial outcomes. This is by itself a considerable contribution to a coveted analytical framework on the political geographies of electrification in regional peripheries. Significantly, electoral concerns mattered for the two incumbent parties throughout the twenty-three years under analysis, in a reflection of the highly competitive electoral system of Ghana since 1992. This ensured the persistence of electoral calculations in the territorial strategies of access to electricity over an extended period of time. Such persistence is a *rara avis* in the often fragmentary and inconstant programmes of electrification in the peripheries of African countries. One tentative hypothesis is that electoral calculations matter for electric territorialities, and they do so over time because the highly competitive political system of Ghana. Second, even though electoral calculations were paramount in shaping territorial strategies of electrification, the transition from the first to the second period intimates the presence of other concerns, a certain "revenge of geography." Cost-benefit considerations started to gain in importance once those communities in the vicinity of the grid were electrified and increases in rates of access had to be gained at the expense of extending the grid to more remote areas. But geographical determinism is, again, incomplete as an explanation. Even the most casual observer of the Ghanaian electric regime will conclude that outside pressure for sectoral reform, enshrined by tariff hikes, and regular episodes of load shedding, catapulted the issue of financial sustainability to the top of the political agenda. This played out against the continuity of the scarcely cost-effective electrification programme in the north, which nonetheless progressed relatively unhindered. This puzzle will be addressed in chapter 5, which analyses together the territorial strategies of provision in northern Ghana and southeastern Tanzania and the shifts in the national distributional settlement that undergirded them.



## 4 Territorial strategies of access in southeastern Tanzania, 2004-15

In the early 2000s the renewed interest in the exploitation of the massive reserves of gas of southeastern Tanzania shifted the region's status. Overnight, Mtwara and Lindi ceased to be part of *l'Afrique inutile* and became one of the most richly endowed regions in East Africa. This seismic change did little, however, to alter the abysmal socioeconomic condition of the population in the region. It shifted, though, their expectations. *Wananchi* in the south started to nurture images of multiple opportunities for employment and business ventures.<sup>36</sup> The discourses by politicians and the media, and their grandiose narratives depicting an imagined Mtwara as a sort of Dubai, did the rest. Against this background, this chapter sets out to explore the territorial strategies of electrification in this gas-abundant regional periphery. On its own, the alteration in the spatial patterns of electrification within southeastern Tanzania offers a perspective from which to analyse the attendant displacement in territorial strategies of electrification. In addition, the contrast between the gas-rich southeastern Tanzania and the poorly-endowed northern Ghana suggests the salience of natural resources in accounting for the variegated trajectories of electrification.

The analysis traces the electrification of the regions of Mtwara and Lindi, in southeastern Tanzania, from 2004 through 2015. This period saw the first exploitation of the massive gas deposits, both offshore and onshore, estimated at 55 trillion cubic feet, or enough to approximately cover the demand of all the households in the United States in 2016 for 12 years.<sup>37</sup> The analysis characterizes the alteration in spatial patterns of electrification across two periods: 2004-12, which roughly corresponds to the implementation of the 'Mtwara

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<sup>36</sup> *Wananchi* means citizens in Swahili and is commonly employed to denote the average citizen.

<sup>37</sup> Own estimate with data from the U.S. Energy Information Administration. Source: <https://www.eia.gov/tools/faqs/faq.php?id=50&t=8> (accessed July 13, 2017).

Energy Project,' a failed scheme conceived to ultimately outsource electricity generation and distribution in the region to a private company; and 2012-15, in which TANESCO resumed full responsibility for provision of electricity in a context of widespread dissatisfaction triggered by the construction of a gas pipeline from Mtwara to Dar es Salaam. Connecting the evolution of electrification with political developments in the country and the region, the analysis illustrates how gas endowments only partially explain the trajectory of electrification in Mtwara and Lindi. More concretely, the analysis shows that even though endowments certainly provided a motivation as well as the material possibilities for political strategies conceived by rulers in Dar es Salaam, the strategies devised in the capital had to be adapted in response to local dynamics and, in particular, to the "infrastructural grievances" made manifest in the region, particularly in the riots of May 2013, over extracting gas from Mtwara to Dar es Salaam. The riots of May 2013, which were a manifestation of local disgruntlement, ushered in a new strategy of access in Mtwara and Lindi, premised on the idea of using access to electricity to appease and compensate the disgruntled locals. To that end, specific measures were put in place to render access more economical in both regions. These measures were unique for Mtwara and Lindi and did not apply to any other region in Tanzania.

Against the backdrop of the abundance of fossil resources in southeastern Tanzania since the mid-2000s, the analysis traces the evolution in the territorial strategies of access from 2004 through 2015. The rationale is analogous to the previous chapter's. By characterizing varying spatial patterns of electrification over a period during which geography, demography, and income levels remained basically constant, the design can single out the influence of the shifting political strategies. The major variation during the period concerned the size of resource (gas) endowments.<sup>38</sup> However, the change is merely quantitative and not qualitative, as even the lesser discoveries of the early 2000s had already whetted the

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<sup>38</sup> Although already in the early 2000s foreign actors were already interested in exploiting Tanzania's southern gas reserves, it was in the early 2010s that the actual size of the deposits was confirmed. Thus, in 2011 proven reserves increased from 7.5 to 10 trillion cubic feet (tcf); in 2012, to 28.74 tcf; and in 2015 from 46.5 to 55 tcf. See <https://www.reuters.com/article/ozabs-tanzania-gas-20110923-idAFJQE78M04S20110923>, <https://af.reuters.com/article/investingNews/idAFJQE85I06C20120619> and <https://af.reuters.com/article/africaTech/idAFL5N0YT0NO20150607> (accessed September 7, 2018).

appetite of actors in Dar es Salaam and outside Tanzania, as the Mtwara Energy Project (see below) demonstrates.

The Tanzanian case also adds an additional element to the discussion. The region developed an autonomous electric grid, not connected to the national network and relying on an autonomous source of energy, ie gas locally available. Accordingly, the isolation of the grid made it possible to conceive of alternative institutional designs for the provision of electricity. This component will be scrutinized in detail in chapter 5. Suffice to say here that the “splendid isolation” of Mtwara as far as energy resources are concerned opened the door to a scheme according to which a private concession would operate electricity generation and provision in the region. All in all, the choice of southeastern Tanzania as a case study contributes to the research design in two directions. First, the analysis of the spatial patterns of electrification in the region during the two periods mentioned above helps bringing into sharp relief the shift in the territorial strategy towards the region. Second, by comparing southeastern Tanzania and northern Ghana the analysis contrasts the influence of exploitable endowments over trajectories of peripheral electrification.

The first section of this chapter presents an overview of developments in the delivery of access to electricity in southeastern Tanzania from 2004 to 2015. This section identifies two distinct periods in which spatial patterns of electrification differed notably. Like in the previous chapter, those spatial patterns are represented graphically, in this case for Mtwara, the region in which most infrastructural activity occurred. The second section discusses the territorial strategies of access that arguably account for the differences in spatial patterns of electrification observed. Lastly, the conclusion summarizes the chapter’s main argument and its findings and connects them to the more general question of the territorial strategies of electrification in richly endowed peripheral regions.

#### **4.1. Unmaking a periphery? Southeastern Tanzania, 1940s-2000s**

For decades, the heavy storms of the rainy season invariably rendered the road connecting Mtwara and Dar es Salaam impassable for several months. In the rainy season, citizens and merchandise in transit from Mtwara or Lindi to Dar, and vice versa, were left with no choice but to set sail. It was not until 2003 that an all-weather road was built. Even before its

inauguration, the road came to be emblemized by the 970-m long Mkapa bridge over the Rufiji River, which professedly owed its construction to the political push of then President Benjamin Mkapa, himself a native of the Mtwara region. That political drive was nonetheless notoriously feeble throughout the nine years that elapsed between the time the Japanese cooperation conducted the first feasibility study in 1971 and works commenced in 1980; and conspicuously absent during the additional 23 years that went by before the road was completed. The government's apathy towards the project became so offensive to the inhabitants of the south east that in 1987 one of their MPs provocatively insinuated that the region would do well to turn the south in search of another state more committed to delivering decent communications. This veiled threat brought little real effect, but nonetheless anticipated the move by an opposition candidate in 1995 to tap into the deep feeling of infrastructural grievance, and elevate the topic to a central argument in his electoral confrontation with future President Mkapa (Mesaki and Mwankusye 1998). The bridge and the all-weather road connecting the South East of Tanzania to the economic capital of the nation are but one indication of the extent to which infrastructure has repeatedly mediated the political relations between the southeastern periphery and the centre. Indeed, over decades this and other *Afriques inutiles* have received pledges to deliver development from presidents, ministers and senior officials that equate economic growth with the deployment of various types of infrastructure. Under the British, the grandiose Groundnut Scheme of the late 1940s and early 1950s produced a new port in the Mtwara harbour, a more modest electric generator for the white and administrative quarters of the town, and a 160-km long railway line linking the harbour with Nachingwea. Unluckily for the new rulers of the nascent Tanzania, the railway line ultimately triggered more anger than development. Upon the abandonment of the scheme, the line was pulled up in 1962. The removal was met with disgruntlement by the locals, who disapproved of the allegedly unfair transfer of the tracks to build the new railway link between Ruvu and the more developed north of Tanzania (Burton 2014; Rizzo 2004). Later on, the flourishing international cooperation of the 1970s and 1980s supplied with characteristic liberality a significant number of water supply schemes, feeder roads, schools and dispensaries (Voipio 1998). Last but not least, the 2000s saw an electrification spree, which continues to this day, that has yielded a bigger gas-fed power plant in Mtwara, as well as the creation of a self-contained electric network in splendid isolation from the Tanzanian National Grid System.

The finding of large gas deposits in Mtwara and Lindi in the early 2000s hardly came as a surprise to the well-informed observer of the oil and gas industry. Agip, the Italy-based multinational, had already discovered sizeable gas reserves in Mnazi Bay (Mtwara region) as early as in 1982. The Energy Policy of Tanzania of 1992 had already mentioned the discovery in Mnazi Bay, 'yet to be delineated but...potentially an important resource of indigenous energy' (MWEM 1992, 4). Since Agip was chiefly interested in oil, it deemed the exploitation of gas unprofitable, though. Exploration rights were accordingly relinquished to the Tanzanian state (Pedersen and Bofin 2014; World Bank 2011). Various international oil companies nevertheless continued their explorations throughout the nineties. Their findings in the late 1990s were a game changer. The identification of the Songo Songo gas reserves provided the first indication of the existence of considerable hydrocarbons reserves off the Tanzanian coast roughly midway between Dar es Salaam and Mtwara. The Songo Songo field started production in the early 2000s, in part to supply industries in Dar es Salaam, e.g. the cement factory at Wazo Hill, but also the new gas-to-power Songas plant that started to operate in July 2004. The license to exploit the onshore reserves at Mnazi Bay, south of Mtwara, was granted to the Canada-based company Artumas (later Wentworth); offshore deposits were licensed out to various companies, namely Ophir, Statoil, British Gas and Exxon Mobil. Altogether, commercial production at onshore fields kicked off in 2004. The account that follows describes two periods. The first, 2004-12, opens on May 18, 2004 when the Parliament of Tanzania approved the Production Sharing Agreement between Artumas, a gas company, and on the other hand, and the Ministry of Energy and Minerals (MEM) and the Tanzania Petroleum Development Corporation, for the Mnazi Bay Gas Development Project for Power Generation, Distribution and Transmission in the Mtwara and Lindi Regions (Artumas Group Inc. 2005). It covers the development of the so-called Mtwara Energy Project (UNFCCC 2008), which envisaged the conversion of gas to power in a plant in Mtwara (inaugurated in December 2006), the fusion of the three existing isolated grids into one (completed in 2010), and the leasing of the regional grid to a private utility (never implemented). This first period closes coinciding with two breakthroughs: the retroversion of the power plant and the transmission assets to TANESCO which was made effective in March 31, 2012, and the riots in May of the following year after the MEM announced that the Mtwara-Dar pipeline would be built regardless of local opposition. These events ushered in the second period, 2012-15, that covers the provision of electricity during the construction



of the pipeline, finally commissioned in October 2015. This period saw no major infrastructural additions to the regional grid, except for a number of rural electrification projects, but several distinct measures were nonetheless put in place to increase access in Mtwara and Lindi and diminish the dissatisfaction of local electricity consumers. In comparing both periods, the analysis highlights the variation in the territorial strategies of access to electricity, against a constant landscape of remoteness from the capital, low density and rich endowments.

The exploitation of onshore gas in Mtwara since the mid-2000s caused a major change. For the first time in decades since the Groundnut Scheme, Mtwara and Lindi were in the headlines in terms that evoked wealth, not backwardness and poverty (Seppälä and Koda 1998). Gas also altered the calculations of political and economic elites in the centre. The ‘Mtwara will be like Dubai’ narrative enshrined this new mood. The comparison was formulated by President Kikwete in an electoral rally in Mtwara in 2010 but promises of development had a long history in Mtwara.<sup>39</sup> The colonial Groundnut Scheme of the 1950s, or the pursuit of *ujamaa* in the 1970, attest to that. More recently, in 2004, President Mkapa launched the Mtwara Development Corridor initiative with these words:

We are also committing ourselves to a public-private partnership to exploit the abundant natural resources along the corridor, such as minerals, energy, agriculture, forestry, fisheries and tourism. We are confident that the economic linkages that will emanate from all these activities will open many opportunities for self-development for our people.<sup>40</sup>

The Mtwara Development Corridor drew not only in the extraction of coal and iron in the vicinities of Lake Malawi, it also built on the industrialization of Mtwara propelled by the presence of gas.

In the last decade, taxation efforts in Mtwara intensified, according to the number of registered taxpayers across all categories (see figure 19). Corporation, Pay-As-You-Earn

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<sup>39</sup> Similarly, in April 2014 Kikwete reiterated the Dubai metaphor, in this case by comparing it with the refurbished port of Dar es Salaam: ‘If we invest in logistic centers, improve on infrastructure and create a facilitative environment, we can easily turn Dar es Salaam into another Dubai of its kind’ (<http://www.reuters.com/article/us-africa-summit-tanzania-transportation-idUSBREA3A1JN20140411>, accessed December 17, 2016).

<sup>40</sup> Source: <http://www.sardc.net/en/southern-african-news-features/four-countries-one-people-one-development-corridor-mtwara/> (accessed December 18, 2016).

(PAYE) and Skills Development Levy taxpayers multiplied by six from 2004 to 2013. The growth in Value Added Tax (VAT) taxpayers was also remarkable, even though after the mid-2000s it 'only' multiplied by four.<sup>41,42,43</sup>

Accordingly, an increase in collected revenue followed (see figures 20 to 24). This was nonetheless heterogeneous across tax categories, however. Revenue from import duties and export levies also multiplied by a factor of four to six. Revenue from VAT took a similar course. By contrast, direct tax collection from individual traders (presumptive or assessed) remained stable. The sharp income bump observed in the figure below is an effect of payments by two of the largest taxpayers in Mtwara, Ndovu Energy and Wentworth, both major players in gas extraction, who were transferred to the Larger Taxpayers Unit in Dar es Salaam in September 2012 (TRA Mtwara Regional Manager 2014).

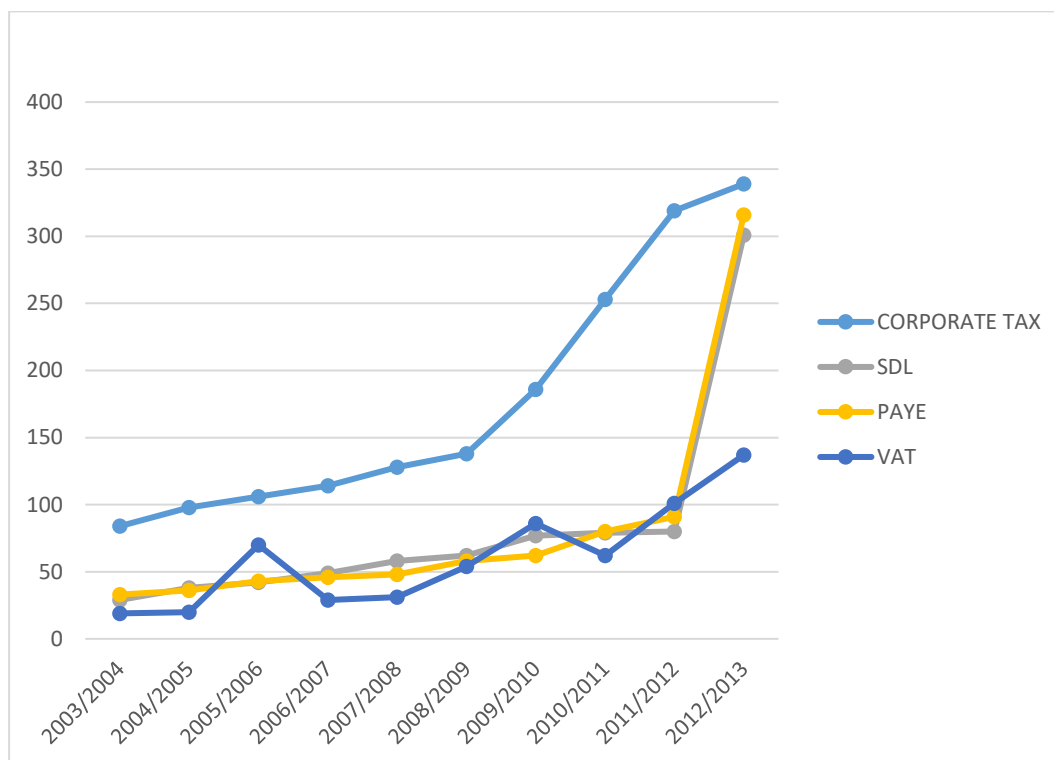
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<sup>41</sup> 'Corporation Tax is a tax charged on the taxable incomes (Profits) of entities such as limited companies and other organizations including clubs, societies, associations and other unincorporated bodies.' Source: Tanzania Revenue Authority (<http://www.tra.go.tz/index.php/corporation-tax/108-what-is-a-corporation-tax>, accessed March 13, 2017).

<sup>42</sup> 'PAYE stands for Pay-As-You-Earn. It is a withholding tax on taxable incomes of employees. Under this system, an employer is required by law to deduct income tax from an employee's taxable salary or wages.' As of 2017, it was set at 9% of income over a threshold monthly income of TZS 170,000, up to 30% over TZS 720,000. Source: Tanzania Revenue Authority (<http://www.tra.go.tz/index.php/payee>, accessed March 13, 2017).

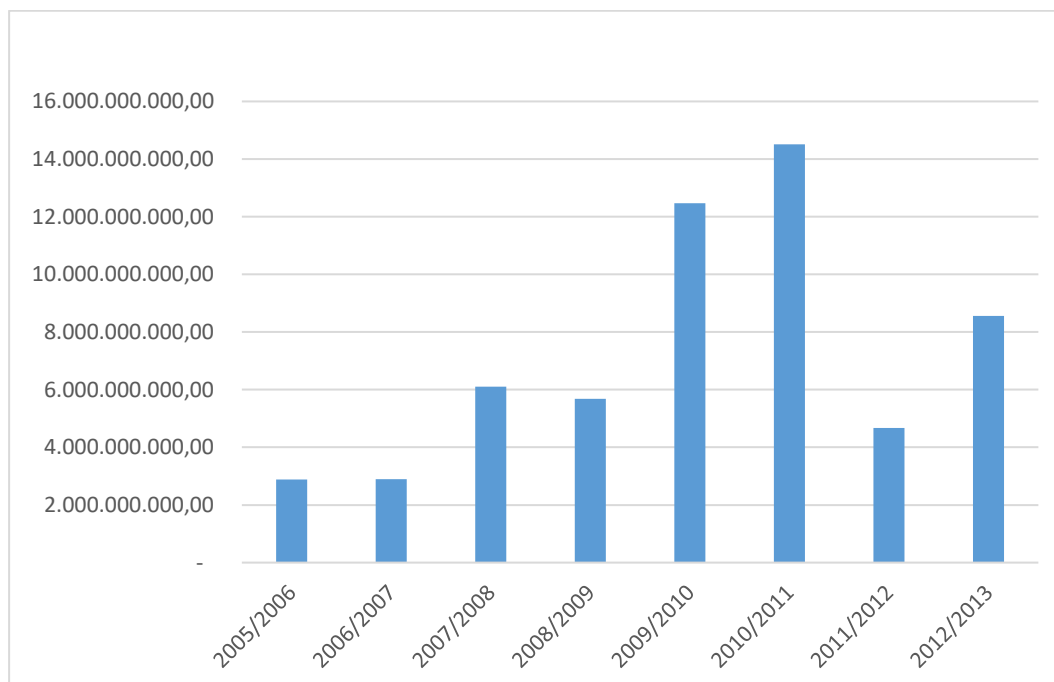
<sup>43</sup> 'Skills and Development Levy: is a levy collected by TRA under the Vocational Education Training Act and Income Tax Act.' As of 2017, it was set at 4.5% of the total emoluments. Source: Tanzania Revenue Authority (<http://www.tra.go.tz/index.php/skills-development-levy-sdl>, accessed March 13, 2017).

**Figure 19: Number of registered taxpayers in Mtwara, 2004-13.**



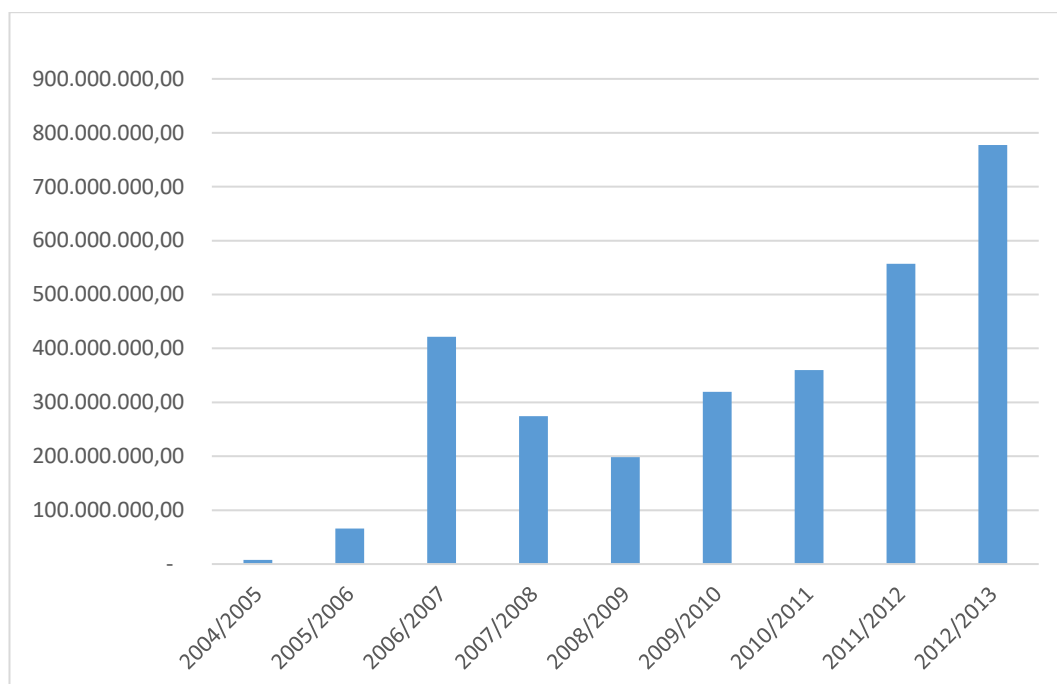
**Source: Unpublished data from Tanzania Revenue Authority (TRA).**

**Figure 20: Total revenue collection (TZS) in Mtwara, 2006-13.**



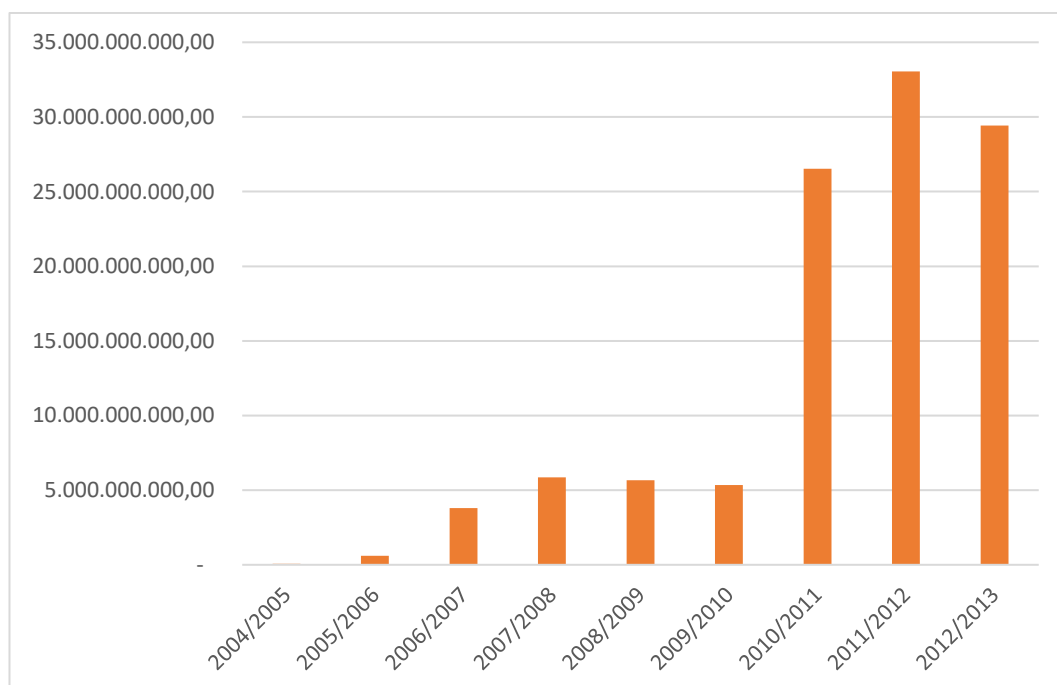
Source: Unpublished data from TRA.

Figure 21: Tax revenue collected (TZS) from import duties, Mtwara, 2005-13.

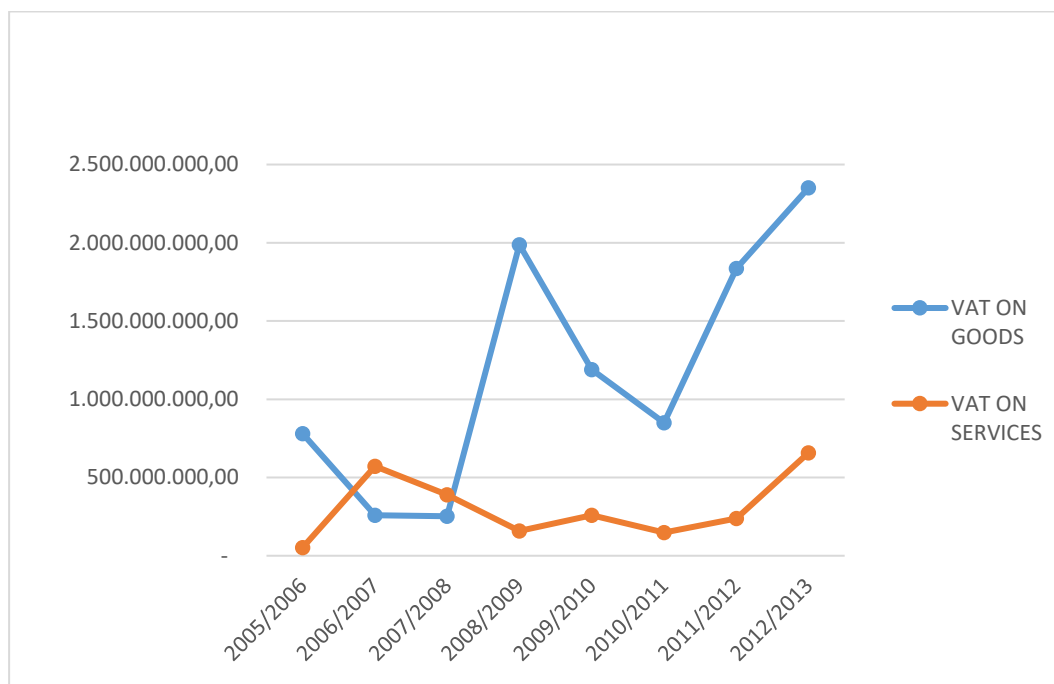


Source: Unpublished data from TRA.

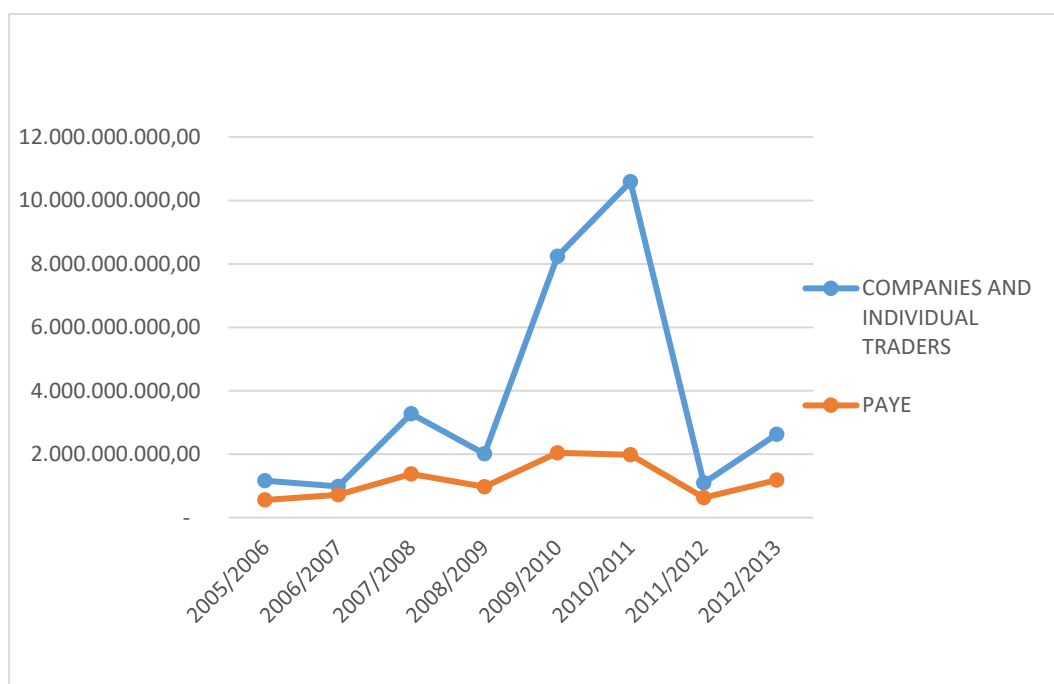
Figure 22: Tax revenue (TZS) collected from export levies, Mtwara, 2005-13.



Source: Unpublished data from TRA.

**Figure 23: Tax revenue (TZS) from VAT on goods and services, Mtwara, 2005-13.**

Source: Unpublished data from TRA.

**Figure 24: Tax revenue (TZS) from direct taxes on individual traders, Mtwara, 2005-13.**

Source: Unpublished data from TRA.

Overall, the pattern that emerges is one of solid growth in revenue collection, even after two large taxpayers were transferred from Mtwara to Dar es Salaam in the early 2010s. Had this not happened, revenue collection from corporate tax in Mtwara would have soared after 2012, as it did in the two previous fiscal years. The phenomenon reveals the massive reliance on corporate earnings, the value added tax on goods and import and excise duties for tax income in Mtwara. Income taxation through PAYE and income from individual traders increased sluggishly or remained constant, even though the number of registered taxpayers soared.

Even with certain qualifications, the expansion of tax collection in Mtwara outdoes that of the whole of Tanzania (see tables 17 and 18 below). Again, once data is disaggregated, it becomes evident that the disparity is more intense in indirect than in direct taxation, which in the second half of the mid-2000s grew in Mtwara slightly more than the national average.

**Table 17: Growth in tax revenue (%) in Mtwara, 2006/07-2010/11.**

|                   | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|-------------------|---------|---------|---------|---------|---------|
| Tax revenue       |         |         |         |         |         |
| Import duty       | 782.2   | 538.3   | -35     | -27.7   | 61.2    |
| Excise duty       | N/A     | N/A     | N/A     | -94.2   | -20.7   |
| Value Added Tax   | -0.1    | -22.8   | 234.2   | -32.5   | -31     |
| Income tax (PAYE) | 30.1    | 90.7    | -29.5   | 110.9   | -3.1    |

**Source: Unpublished data from TRA.**

**Table 18: Growth in tax revenue and GDP, Tanzania, 2006/07-2010/11.**

|                 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 |
|-----------------|---------|---------|---------|---------|---------|
| Tax revenue     |         |         |         |         |         |
| Import duty     | 27.2    | 19.1    | 24.2    | 13.5    | 12.5    |
| Excise duty     | 98.8    | 27.1    | 15.3    | 17.4    | 15.9    |
| Value Added Tax | 3.6     | 25.4    | 18.1    | 8       | 28.5    |
| Income tax      | 29.3    | 37.3    | 24.9    | 8.6     | 18.8    |
| GDP             | 7.1     | 7.4     | 6       | 7       | 7.1     |

**Source: Ministry of Finance, Tanzania (2011).**

As shown above, tax collection firmly expanded in Mtwara between the mid-2000s and the early 2010s. This reflected a certain resurgence in economic activity, chiefly induced by gas exploration. The expansion exceeded by far not only the growth in Gross Domestic Product (GDP) in Tanzania in the same period, but also the overall spurt in tax collection in the country. This provides a first indication not only of the expansion of grip of the state over Mtwara (through taxation) in this period, but also of a certain dynamic of regional economic re-engineering undergirding that expansion.

#### **4.1.1. Making an electric periphery**

As electrification is concerned, German rule over Tanganyika only brought modest improvements.<sup>44</sup> The German administration attempted to develop the embryo of an industrial base, but to little avail. Only minor developments in lighting yielded some novelties, even if they reached public notoriety like the 'House of Wonders' in Zanzibar (Winther 2010), and privileged areas of Dar es Salaam (R. H. Ghanadan 2008). The British Mandate and later the Trusteeship brought few novelties (Showers 2011). In the 1930s the bulk of the electric supply was provided by scattered generators in urban areas and mini-hydropower plants in areas close to productive ventures, e.g. sisal plantations. Pangani Falls, the first significantly sized hydropower facility, was built to supply the sisal industry in the north (van der Straeten 2014). By and large, domestic consumers did not reap the benefits of electrification until well into the 1950s.

The southeast of Tanzania was no exception (Seppälä and Koda 1998). Since the fifties, a limited number of selected urban areas, mostly district capitals, had been supplied through stand-alone fuel generators. In fact, for more than sixty years, electricity in southeastern Tanzania had been provided by TANESCO-operated fuel generator sets (Former TANESCO Deputy Managing Director Finance 2014). Fuel gensets arrived in Mtwara, Lindi and Nachingwea in the late forties and fifties, as a corollary to the grandiose Groundnut

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<sup>44</sup> Electricity was introduced in 1908 in German-ruled Tanganyika for the railways. See TANESCO's website: [http://www.tanESCO.co.tz/index.php?option=com\\_content&view=article&id=38&Itemid=126](http://www.tanESCO.co.tz/index.php?option=com_content&view=article&id=38&Itemid=126) (accessed May 15, 2016).

Scheme.<sup>45</sup> The enthusiasm triggered by the Scheme awakened Mtwara from its condition of 'sleepy little seaside township', and electrification contributed to it (Johnston 1983, 8). Fuel generators were installed in Lindi [1949] and Mtwara [1952] for the comfort of the small community of contractors and bureaucrats. The generators were nonetheless meant for the exclusive advantage of 'the European housing area, hospital, and Administrative blocks' (C. P. J. Kelly 2011, 362).<sup>46</sup> The Groundnut Scheme ultimately failed to develop Mtwara and Lindi, but both towns still retained their fuel generators. In the hinterland, electricity was notoriously absent. The lack of economic sense was in part compounded by the realization that electricity was scarcely a priority for villagers. Even the developmental thrust immediately after independence, a decade later, did not yield substantial improvements in the short term. Nachingwea and Liwale only received fuel generators in 1975 and 1977, respectively.<sup>47</sup> Even Masasi, a district capital as well as an industrial town, had to wait until 1984-85.<sup>48</sup> Interestingly, the 4.5 MW fuel generator installed in Masasi was seconded by a noticeable development: originating in Masasi, two 33 kV distribution lines were laid out to Newala (Mtwara region) and Nachingwea (Lindi region).<sup>49</sup> The lines were to assist the ailing cashew nut industry in its efforts to progress towards processing raw produce locally. Whether electrification contributed to the rising production levels from the early 1990s onward remains unclear. The mini-grid linking in the 1990s Masasi, Nachingwea and Newala was expanded in 2000 by means of a prolongation from Newala to Tandahimba, and from Nachingwea to Ruangwa (both in the Lindi region). Overall, by the mid-2000s the topology of

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<sup>45</sup> The high-flown expectations sparked by the colonial Groundnut Scheme of the late forties and early fifties and its subsequent failure are well documented (Bourbonniere 2013; Coulson 1982; Hogendorn and Scott 1981; Johnston 1983; C. P. J. Kelly 2011; Myddelton 2007; Rizzo 2006; Wood 1950). There is a high probability that the fuel generator installed in Nachingwea in the fifties was intended for the nascent cashew nut industry, not for the town's population.

<sup>46</sup> 'Electricity was still being run on 17 June, three more weeks were needed to complete the high-tension wires. Officials prioritized those areas where they lived and worked: the European housing area, hospital, and Administrative blocks. African areas were not slated to receive electricity, the tacit assumption by all governmental and contracting parties was African residents were not in need of such and were unlikely to afford the extra costs' (C. P. J. Kelly 2011, 362).

<sup>47</sup> Whether this may be linked to *ujamaa vijijini*, which the government pursued intensely in Mtwara and Lindi (Coulson 1982), remains uncertain.

<sup>48</sup> Sources for electrification dates: Republic of Tanganyika (1964); TANESCO (1962); Kjellström et al. (1992); Hill and Moffett (1955); Amann (1969); Reichel (1977). Also data gathered from TANESCO Head Office. For the cashew nut industry in Mtwara, the source is Seppälä (1998).

<sup>49</sup> I have been unable to confirm whether the same extension also reached Ndanda from Masasi. Similarly, the years of the connections from Lindi to Nyangao and from Newala to Kitangari are unknown.



electrification across the south-east adopted the shape of an incomplete web of three isolated mini-grids (see map 9 in the Appendixes). The National Grid System was still about 400 kilometres away. One genset-fed grid supplied well-off and commercial customers in Mtwara town, and reached the coastal settlement of Mbuo, some 30 km north-west along the coast; a second genset-fed grid started in coastal Lindi, followed the coast to Mbanja in the north, and penetrated the backcountry to Nyangao to the west; the third and largest genset-fed mini-grid supplied the agricultural hinterland, originating in Masasi and reaching out, on one end, to Newala, Tandahimba and Kitangari, and on the other end to Nachingwea and Ruangwa, home to sizeable cashew nut factories (TANESCO Mtwara Regional Accountant 2014; TANESCO Mtwara Regional Engineer 2014).

## **4.2. The electrification of southeastern Tanzania, 2004-15**

### **4.2.1. The Mtwara Energy Project: private distribution utility, 2004-12**

In 2004 the future was bright for the company developing the gas wells, Artumas, after it started commercial exploitation at Mnazi Bay, some forty kilometres south of Mtwara town. In 2004, the Mtwara Energy Project envisaged exploiting the gas reserves at Mnazi Bay, laying a 27-km pipeline from Mnazi Bay to a 30-MW gas-to-power plant in Mtwara, and upgrading, operating and maintaining approximately 205 kilometres of transmission lines, and 400 kilometres of distribution grid across the Mtwara and Lindi regions, with a total capital investment of US\$ 97 million. The transmission lines included a 132-kV link that never materialized. A Transmission and Distribution Franchise Agreement would set the terms for the lease of the existing lines to a subsidiary of Artumas, Umoja Light, which would take over from TANESCO the operation of transmission and distribution in the region for an initial franchise period of 25 years (Artumas Group Inc. 2005). The following year, however, the power plant was scaled down to only 12 MW. Additionally, Artumas outsourced the transmission and distribution component to the Canadian company Manitoba Hydro International, choosing to concentrate on its core business of gas exploitation (Artumas Group Inc. 2006). December 2006 brought the first generation of electricity in the Mtwara power plant, fully commissioned on March 5, 2007 with all its six 2-MW Caterpillar units completely operational. The plant was later expanded to 18 MW in 2010, under the agreement that Artumas retained an exclusive right to generate up to 30 MW in the south-

east region. At this stage, the plans of Artumas for the expansion of the Mtwara Energy scheme included a 300-MW power plant connected to the national grid through a several hundred kilometre long high-voltage link (Artumas Group Inc. 2007).

The Mtwara power plant yielded results immediately, and in its first year of operation increased the load in Mtwara town by 24% (Artumas Group Inc. 2008). The whole scheme was supposed to benefit TANESCO and, ultimately, the local customers. The cost of electricity sourced from the nearby gas wells was expected to drop by a third, from US\$ 0.42/kWh (kilowatt-hour) to US\$ 0.1195/kWh, according to the Interim Power Purchase Agreement signed with the MEM (K. N. Gratwick 2007; Wentworth Resources Ltd. 2011b). The plant operated according to calculations: in 2010 it attained an average peak load of 10.7 MW, against its total capacity of 18 MW (Wentworth Resources Ltd. 2012). As part of the global agreement, between 2008 and 2010, Artumas, via its subsidiary Umoja Light, laid the grids connecting the urban centres of Mtwara, Lindi and Masasi, thus converting the extant disconnected grids into a single regional network (see figure below).<sup>50</sup> Artumas anticipated that grid expansion would increase rural demand, also assisted by rural electrification projects funded by the Rural Energy Agency (REA). The bill for the grid rollout was nevertheless footed by the Tanzanian taxpayer. The line between Nyangao, Masasi and Lindi, which would expectedly increase access from 17,000 to 45,000 households, was laid thanks to the TZS 8.7 billion disbursed by the National Tariff Equalization Facility (MEM 2009, 29). The overall budget for the Masasi Interconnection Works amounted to US\$ 7.5 million, accrued through a loan agreed with the Government of Tanzania in 2009 (Artumas Group Inc. 2010). Umoja also connected Mtwara and Msimbati in November 2011 (Wentworth Resources Ltd. 2012). Umoja was granted a 15-year licensing exemption by the Energy and Water Utilities Regulatory Authority (EWURA) in 2009, and the attendant tariffs were also approved by the same regulator in June 2010 (Artumas Group Inc. 2010; Wentworth Resources Ltd. 2011d), but the negotiations about the lease of assets from TANESCO to Umoja Light, however, stalled (K. N. Gratwick 2007), and in 2009 Artumas proposed to

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<sup>50</sup> The Mtwara power plant was commissioned at about the same time of REA's first operational activities. REA is the main public body mandated by law to step up rural electrification. The connections between the two developments, if any, remain to be explored. The Mtwara plant also facilitates TANESCO's plans to connect all villages in the Mtwara and Lindi regions in coming years. Some 42 villages allegedly remain un-electrified in Mtwara (TANESCO Mtwara Regional Accountant 2014).

postpone the lease by at least three years (Wentworth Resources Ltd. 2011b). No agreement was reached before the whole Mtwara Energy Project collapsed in 2010. By then, the government of Tanzania had made its intention to transport gas from Mtwara to Dar es Salaam for its use in power generation in the capital public. To that end, it confirmed the construction of a 532-km pipeline linking both cities.

Formerly a neglected area, the supply of electricity in Mtwara and Lindi, particularly in Mtwara town, became high quality overnight. The service became even better than in Dar es Salaam (TANESCO Mtwara Regional Manager 2014). By 2012, and even after the addition of half a dozen towns to the network and the extension of the grid to over 275 kilometres away from Mtwara, the power plant still enjoyed an excess peak capacity of four megawatts (TANESCO Mtwara Regional Engineer 2014). Accordingly, load shedding in Mtwara town was virtually eradicated, and blackouts fell sharply (TANESCO Mtwara Regional Engineer 2014). Yet, as already noted, access to electricity did not improve substantially. In the region of Mtwara the access rate only increased from 2.97% to 6.5% in ten years, from 2002 through 2012.

#### **4.2.2. TANESCO: state-owned distribution utility, 2012-15**

Eight years of mostly private efforts in electrification had laid the ground for the future expansion of access to the rural areas, but at the same time had barely had a tangible effect beyond the urban districts of Mtwara and Masasi. The ultimate aspiration to privatize the generation, transmission and distribution of electricity in the southeastern demarcation, simultaneously increasing access, had failed. On paper, the scheme made a sensible use of abundant local gas at a cost of generation of US\$ 0.1195 per kWh, well beneath the average cost of generation with expensive diesel units, but also beneath the average tariff of US\$ 0.14 per kWh actually collected by TANESCO nationwide (Trimble et al. 2016). At the same time, the Mtwara Energy Project required an increase in demand hardly achievable without a rapid industrialization drive that never arrived. The growth in residential and commercial demand in Mtwara town, or in rural areas, could hardly offset the sluggish growth of industrial demand before 2012. Regional demand thus remained depressed, and as a result the Mtwara Energy Project collapsed. Ironically enough, the distance of Mtwara and Lindi from the national grid played out in favour of the south east. A regional grid fed with abundant local

gas was thus developed, offering a quality of supply superior even to that delivered by TANESCO in Dar es Salaam. But, on the other hand, most of the population remained poor, and industry was still in its infancy.

The pipeline projected from Mtwara to Dar es Salaam made clear to all potential investors that the opportunities from exploiting gas laid in Dar, not in Mtwara. Artumas changed its calculations accordingly and steered its business model towards supplying the pipeline. The new business model added to prior controversies associated with the decreasingly promising Mtwara Energy Project. First, as already noted, the negotiations between TANESCO and Artumas stalled at various points. Second, once the actual works kicked off, Artumas seemingly opted to put economic above technical concerns. According to TANESCO staff, it sneakily deployed sections of the line across the forest, dozens of meters off the road, to avoid compensating landowners (TANESCO Mtwara Regional Engineer 2014; TANESCO Mtwara Regional Manager 2014). This complicated subsequent line maintenance. Finally, the whole Mtwara Energy Project was predicated upon estimates of industrial and residential demand of about 90 MW.<sup>51</sup> Unfortunately for Artumas/Wentworth these estimates were soon revealed to be overly optimistic and the anticipated rate of return of 20.5% over 20 years did not materialize (Artumas Group Inc. 2009).<sup>52</sup> When the company realized that industrial and household demand would grow below its estimates, it lost interest in the transmission and distribution segment (TANESCO Masasi District Manager 2014; TANESCO Mtwara Regional Engineer 2014; TANESCO Mtwara Regional Manager 2014). According to the Minister of Energy, it was the 'economic recession [*mdororo wa uchumi*]' that provoked the scheme's demise (Muhongo 2012, 43). Artumas/Wentworth offered a different, possibly complementary, explanation. According to the private utility, in 2010 it failed to secure a US\$ 28.8 million grant from the Dutch government, which the company deemed vital to guarantee the financial viability of the scheme. Allegedly, Artumas/Wentworth failed to obtain this loan due to the delays incurred by EWURA in approving the tariffs (Wentworth Resources Ltd. 2011a). This only aggravated the effect of the losses of approximately three

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<sup>51</sup> Dangote's cement project in Mtwara (finally inaugurated in October 2015) soon became the focus of every hope of spurring industrial demand in the area. This impacted public policies as well. See, for instance, the Power System Master Plan Update of 2012 (MEM 2013). The same policy document also envisaged a load of 200 MW from the Economic Processing Zone anticipated in Mtwara's port.

<sup>52</sup> In September 2010, Artumas merged with Wentworth Resources Ltd and adopted the latter's name.

hundred million dollars that Artumas/Wentworth had accumulated since the mid-2000s (Wentworth Resources Ltd. 2011c, 2011d). Consequently, the whole venture collapsed. The last attempt to revitalize the investment in the region was a Memorandum of Understanding signed with the Tanzanian government in June 2010 to accelerate plans to use gas to produce fertilizer, methanol and other products (Wentworth Resources Ltd. 2011b). Once the Mtwara Energy Project failed, the Tanzanian state bought the power plant and other minor assets property of Umoja Light back. In an agreement made effective on March 31, 2012, the 18-MW Mtwara power plant was valued at US\$ 13.5 million. The total distribution assets of Umoja Light and the generation assets of Wentworth were worth US\$ 22 million (Wentworth Resources Ltd. 2013a). Most personnel employed in the plant was hired by TANESCO (TANESCO Masasi District Manager 2014; TANESCO Mtwara Regional Engineer 2014).<sup>53</sup>

By 2012 the regional electric grid in southeastern Tanzania had almost reached its current material configuration (see map 8 in the appendixes for the layout of the grid in 2012). The only expansion of the grid after 2012 came from a 33-KV branch from Masasi to Nanyumbu implemented by TANESCO in 2014 after recovering the monopoly over transmission and distribution in the region. The extension brought a spur to the border crossing with Mozambique at the Umoja Bridge over the Ruvuma River. The major breakthrough in 2012-2015 occurred in gas not in power. The government went ahead with its plans to lay the 532-km long pipeline linking Mtwara and Dar es Salaam, inaugurating it in October 2015. The pipeline feeds power generation plants located in the Ubungu and Kinyerezi quarters in Dar es Salaam with the gas extracted by Wentworth in Mtwara. But since the pipeline project was announced, there has been intense controversy in Mtwara. The pipeline project meant that gas extraction and power generation became closely intertwined in the minds of locals. In planning the pipeline's layout, the MEM faced two options. The first, which was finally the one chosen, entailed a gas pipeline from Mtwara to Dar es Salaam to feed power plants at the destination. The second envisaged using the gas locally, generating power in Mtwara thanks to a 600 MW plant project by the US-based Symbion, and concomitantly deploying a high voltage transmission line to Dar es Salaam. Apparently, TANESCO was in favour of the first option (Former TANESCO Deputy Managing Director Finance 2014), but the MEM chose

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<sup>53</sup> See also World Bank (2010a); *The Citizen* (Feb. 17, 2010); Wentworth (2011d); UNFCCC (2008).

the pipeline instead of the transmission line. In the eyes of many in Mtwara, the local plant was preferable, as it was promised a reliable source of abundant power in the region.

Power and gas became even more closely associated after the riots of 2013. On May 22, 2013 an unknown number of demonstrators took to the streets of Mtwara the same day that the Minister of Energy, Sospeter Muhongo, delivered his annual budget speech before the Parliament. Allegedly, locals were following the speech via radio and the state-owned television channel. At a certain point, the Minister announced that works on the pipeline would commence soon, as scheduled, regardless of the opposition of a section of residents in Mtwara who called instead for the building of a power plant in the region. The streets of Mtwara were deserted since early in the morning of May 22, in anticipation of disturbance. The demonstration that ensued after the Minister's announcement engulfed the town in two days of chaos. At least one placard reading '*gesi ibaki au tugawane inchi*' [either the gas remains or we will divide the country] could be read amidst those wielded by demonstrators.<sup>54</sup> Buildings of the ruling party *Chama Cha Mapinduzi* (CCM), and the houses of some of its local leaders, were vandalized and set ablaze. Journalists, especially those from the state-owned television, were subject to abuse and threats, allegedly from both rioters and the police. Anti-riot police forces were called in to quell the protest. The army was also deployed to patrol Mtwara. Demonstrators were later subject to a house-by-house search by the police, during which, allegedly, one pregnant woman was shot. The budget speech before the Parliament was suspended once news of the riots in Mtwara reached the administrative capital. The balance of two days of riots, although difficult to establish with certainty, amounted to at least one dead and ten admitted to the hospital.

The events of May 2013 constituted an aggravated repetition of similar incidents on 19, 26 and 27 of January of the same year, when houses of local politicians were burnt.<sup>55</sup> Then, a delegation of the self-denominated Mtwara Elders travelled to Dar es Salaam to deliver a petition to the government calling for the gas to be processed and converted in Mtwara

<sup>54</sup> Source: <http://www.theeastafrican.co.ke/news/Mtwara-protests-expose-gaps-in-oil-gas-mineral-laws-management/2558-1682724-view-printVersion-nbnlq1z/index.html> (accessed March 24, 2017).

<sup>55</sup> See The Citizen (<http://www.thecitizen.co.tz/News/national/1840392-1860180-tx2qedz/index.html>, accessed March 14, 2017); British Broadcasting Corporation website (<http://www.bbc.com/news/world-africa-22652809>, accessed March 14, 2017); Reuters (<http://uk.reuters.com/article/netherlands-gas-hearing-idUKL8N1K42JH>, accessed March 14, 2017); for dates of riots, see Armed Conflict Location & Event Data Project database (<https://www.acleddata.com/>, accessed May 16, 2017).

instead of pumped out of the region to Dar es Salaam (Lal 2015).<sup>56</sup> A survey carried out between 2014 and 2015 revealed that the persistence of widespread discontent was associated with the local perception that they were ‘being robbed’ of what they deemed rightfully theirs (Must and Rustad 2016). Apparently, the feeling of grievance that motivated the protests of January and May 2013 was spurred on by an electoral address by Kikwete in Mtwara on October 26, 2010, in which he reportedly promised that, with gas in the southeast in abundance, he would make sure if re-elected that Mtwara would become like Dubai, and that 56 factories would be built in the region (Must and Rustad 2016; TCDD 2013). The incidents of January 2013 rendered all the more evident the prevailing dissatisfaction in Mtwara. A few days later, on 31 January, President Kikwete was compelled to publicly announce that only 16% of the gas from Mtwara would be sent to Dar es Salaam, the rest remaining in Mtwara for processing and sales abroad and to the rest of Tanzania. President Kikwete also underlined that gas existed in sufficient volumes to cater to the needs of the industry in Mtwara as well as the production of electricity (TCDD 2013). The Mtwara-Dubai equation was more than a mere electoral argument. In extolling the virtues of the ‘clustered city’, the ‘Mtwara Green City: Beyond Tomorrow’ urban plan for the Mtwara-Mikindani municipality, in preparation since 2014, explicitly acknowledged its inspiration in the Dubai model. This narrative was to a certain degree rubber-stamped by the World Bank, which included Mtwara on the list of seven Tanzanian cities covered by the Tanzania Strategic Cities Project launched in 2010 (World Bank 2010b). All in all, and despite the riots of 2013, plans to construct the pipeline continued unheeded, and it was finally commissioned in October 2015.

#### **4.3. Territorial outcomes in southeastern Tanzania, 2004-15**

Access to electricity in Mtwara and Lindi progressed very slowly between 2002 and 2012. From 2012 to 2016, however, the pace of grid connections increased considerably. Tables 19 and 20 below capture the trend (caveat: the figures for 2002 and 2012 overestimate connections, see notes under both tables).

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<sup>56</sup> See also: <http://forums.ssrc.org/african-futures/2013/08/02/popular-mobilization-and-the-new-politics-of-resource-sovereignty-in-tanzania/> (accessed March 24, 2017).

**Table 19: Electricity access rates in Mtwara region by district, 2002-12.**

|                               | District |       |      |       |       |     |      |       |      |
|-------------------------------|----------|-------|------|-------|-------|-----|------|-------|------|
|                               | 1        |       | 2    | 3     |       | 4   | 5    | 6     | 7    |
|                               | Urban    | Rural |      | Urban | Rural |     |      |       |      |
| Electricity for lighting 2002 | 23.9     | 0.03  | 2.4  | 1.5   |       |     | 0.6  | 2.97  | 9.7  |
| Electricity for lighting 2012 | 31.6     | 1.9   | 5.4  | 15.0  | 3.0   | 0.7 | 4.1  | 6.5   | 18.9 |
| Grid electricity 2016         | N/A      | N/A   | N/A  | N/A   | N/A   | N/A | N/A  | 12.84 | 24.6 |
| Ratio 2012/2002               | 1.32     | 63.33 | 2.25 | N/A   | N/A   | N/A | 6.83 | 2.19  | 1.95 |

**Source:** Tanzania 2002 census (NBS 2004); 2012 census, Mtwara regional profile (NBS 2016b); Energy Access Situation Report 2016 (NBS 2017). **Note:** 1 – Mtwara; 2 – Newala; 3 – Masasi; 4 – Nanyumbu; 5 – Tandahimba; 6 – Regional total; 7 – Tanzania mainland total. Data for 2002 and 2012 indicates electricity as main source of lighting, whilst for 2016, figures indicate households with grid electricity. As solar sources provide 61.1% of households with electricity in the whole Mtwara region, figures of electricity for lighting overestimate grid access.

**Table 20: Electricity access rates in Lindi region by district, 2002-12.**

|                               | District |      |      |      |       |      |      |      |
|-------------------------------|----------|------|------|------|-------|------|------|------|
|                               | 1        | 2    | 3    | 4    | 5     | 6    | 7    | 8    |
| Electricity for lighting 2002 | 2.6      | 0.3  | 7.4  | 2.9  | 0.6   | 30.5 | 4.22 | 9.7  |
| Electricity for lighting 2012 | 12.0     | 7.8  | 11.6 | 11.9 | 10.6  | 31.2 | 12.6 | 18.9 |
| Grid electricity 2016         | N/A      | N/A  | N/A  | N/A  | N/A   | N/A  | 4.9  | 24.6 |
| Ratio 2012/2002               | 4.62     | 26.0 | 1.57 | 4.10 | 17.67 | 1.02 | 2.99 | 1.95 |

**Source:** Tanzania 2002 census (NBS 2004); 2012 census, Lindi regional profile (NBS 2016a); Energy Access Situation Report 2016 (NBS 2017). **Note:** 1 – Kilwa; 2 – Lindi Rural; 3 – Nachingwea; 4 – Liwale; 5 – Ruangwa; 6 – Lindi Municipal; 7 – Regional total; 8 – Tanzania mainland total. Data for 2002 and 2012 indicates electricity as main source of lighting, whilst for 2016, figures indicate households with grid electricity. As solar sources provide 75.5% of households with electricity in the whole Lindi region, figures of electricity for lighting overestimate grid access.



The tables show the remarkable expansion of access between 2012 and 2016, especially when compared to the pattern of feet dragging in the previous decade. In the Mtwara region, access only increased from 2.97 to 6.5% from 2002 to 2012, but it expanded to 12.84 in the following four years. Indeed, access probably increased even more in the 2012-16 period, as the figures for the earlier period are an overestimation of grid access. In the Lindi region, the evolution is more difficult to grasp, as solar electrification is prominent (75.5% of electrified households obtain electricity from a solar source). The figures for access in Lindi are 4.22, 12.6 and 4.9% in 2002, 2012 and 2016, respectively. The reported drop is dubious, as the figures for 2002 and 2012 are likely to be grossly overestimated. The spatial pattern differs only partially between both regions, though. In Mtwara, access between 2002 and 2012 grew in urban and rural districts, but more notably amongst rural districts hitherto virtually unelectrified. The spatial pattern is comparable in the Lindi region, but with even less urban growth in the regional capital. Lindi Municipal is the only district in which the expansion of access is negligible, whilst the rest of districts (with mixed rural and urban populations) see remarkable increases. Between 2012 and 2016 the spatial patterns change, at least in the case of Mtwara. The increase from 6.5 to 12.84% means an absolute increase of 21,862 households.<sup>57</sup> But projects of rural electrification REA implemented within that period aimed at connecting 4,641 customers (TANESCO Manager Electrification 2014), which indicates that the vast majority of connections between 2012 and 2016 in Mtwara were urban.

Two distinct spatial strategies of grid expansion succeeded over southeastern Tanzania from 2004 to 2015. The transition from one spatial configuration to another is qualitatively captured in figure 25 below. Like the figure for northern Ghana in the previous chapter, it represents the patterns of spatial electrification along an axis in which one end is given by extension to rural areas and the other end by urban densification. In the first period, 2004-12, the grid extended over uncovered swathes of Mtwara and Lindi. By consolidating a truly regional network, access could be delivered to rural customers in the vicinities. Nonetheless, the number of rural inhabitants connected was modest. Urban access in Mtwara town and Lindi, and, in parallel, household consumption, increased more rapidly, as a result of the construction of a power plant. Therefore, in the figure the region is represented closer to the

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<sup>57</sup> The figure has been obtained by applying the access rates to the same number of 344,834 households reported in the 2012 census. Thus, the number obtained for households with access was 22,414 and 44,276 in 2012 and 2016, respectively.

extension pole. By contrast, in 2012-15, urban residents gained more salience after the riots. Typically, the unrest of 2012 was urban, and rulers in the capital felt compelled to craft a political fix that worked primarily for the towns. In line with the burgeoning national drive to connect new customers in rural areas, administrators in Dar es Salaam saw in the supply of electricity to the local residents of Mtwara a club good that could function as partial compensation for the extraction of gas through the pipeline. In contrast with the rest of the country, electrification in the South East took on a more decidedly urban nature, although rural electrification was also pursued by REA with the same vigour as in other regions of Tanzania. Conversely, the connection fee rebate and the lax way disconnections were enforced were unique to Mtwara and Lindi. This does not imply that rural electrification was considered irrelevant by the government. There exists the shared understanding in the region that urban residents in the Mtwara and Lindi entertain strong ties with the rural residents of their hinterlands through ties with relatives and investments in agriculture. All in all, the spatial representation of access in 2012-15 drifted towards the densification pole.

**Figure 25: Territorial strategies of access in Mtwara, 2004-15, along the extension-densification continuum.**



**Source: Own elaboration.**

The empirical scrutiny of electrification in Mtwara and Lindi has helped to decipher the spatial patterns of electrification that prevailed from 2004 to 2015 and, crucially, how the pattern shifted after 2012. From 2004 through 2012, the government of Tanzania attempted to electrify the South East by attempting to align its ambition to increase access with the interests of a private utility. It gave the latter exclusive rights to generation, and also advanced towards leasing the distribution assets of TANESCO in the region. In this understanding, rural electrification was at least as important as urban access, as the amalgamation of the erstwhile isolated local grids demonstrates. Politically, electrification

was important for a government keen on showing the benefits of gas for the region. Economically, it was important for the private utility, as it required all the possible demand that it could muster to recoup the investment. In Mtwara town, the availability of more electricity, thanks to the gas power plant, made the rate of access increase naturally, without a need to further expansion the grid. The riots of May brought to the attention of the nation and the political class the intensity of the grievances in Mtwara and Lindi, to which the construction of the pipeline added a new source of “infrastructural grievance.” In this new political context, electricity became one visible example of the benefits for the locals of the extraction of gas in the region. Therefore, the government threw itself into expanding access to electricity throughout the region. As the regional grid already existed, in this second period the material expansion of the grid concentrated on a limited number of spurs to unserved secondary settlements, e.g. Nanyumbu or the border with Mozambique. The government put more emphasis, nonetheless, in facilitating access in the urban areas, particularly in Mtwara, the ground zero of discontent.

Like in the case of northern Ghana explored in the previous chapter, the territorial strategies of electrification unfolded against the backdrop of constant geography, demography, low income and resource endowments. This suggests that territorial strategies shaped the spatial pattern of access to a considerable degree. Crucially, it hints at the notion that the change in the strategy of electrification after 2012 also probably responded to the central government’s shift in the political strategy of access. This shift was reflected in new urban priorities as well as in specific policies to facilitate access in Mtwara and Lindi. The salience of the expression of infrastructural grievances is explored in more detail in the next section and compared with an alternative explanation for the change observed in 2012, namely electoral calculations.

#### **4.4. Core-periphery linkages: infrastructural grievances in territorial strategies of access**

This section argues that, in contrast with northern Ghana, the main driver that accounts for the territorial strategies of access in southeastern Tanzania after 2012 was not the search for narrow electoral gains but the state’s response to voiced infrastructural grievances in the region. The analysis pays singular attention to the potential shift in core-periphery linkages

around 2012, as this year (together with the subsequent riots) signals a rupture with the previous territorial strategy of access. As in the case of northern Ghana, this section draws on the set of four core-periphery linkages identified in the theoretical chapter. Amongst the four, the weakest candidate to account for the rupture after 2012 is legitimacy building. After all, for decades the development of the southeast had not featured very high in the concerns of Tanzanian citizens, and there is no reason to believe that the discovery of gas, or the riots of 2013, would weigh sufficiently to change that attitude and thus induce the central government to embark upon a development path in the southeast. Accordingly, this section assesses the relative weight of infrastructural grievances, electoral calculations and regional economic re-engineering as a plausible source of change in the political strategy of access.

As infrastructural grievances are concerned, the protests of May 2013 marked a rupture in the government's territorial strategy towards Mtwara and Lindi since the early 2000s. The government was forced to change tack and step up rural electrification. Before 2012, the amalgamation of the grid in the South East had not been accompanied by any significant project of rural electrification, as proved by REA's annual reports (REA 2008, 2010, 2011, 2012, 2013a). The projects of the Turnkey Phase I (2010-2014) aimed to achieve 20,000 connections, but none was intended for Mtwara. Rather surprisingly, therefore, in 2012-13 several projects targeting Mtwara, Lindi or both received the green light. This flurry of rural electrification, compared with the atony of the previous decade, reflected a new interest in electrifying the rural and semi-rural settlements that the government deemed as development centres or poles (see map 11 in the appendixes). Accordingly, efforts in rural electrification were stepped up. The Turnkey Project Phase III was also planned in 2016-17, and expected to run until 2018-19. Certainly, the fresh drive in rural electrification was not unique to Mtwara and Lindi; it was part of a reinvigorated drive to increase access nationwide. The Tanzanian government augmented domestic funding to REA by 50%, to about US\$ 240 million (of which only nine came from donors) (Muhongo 2016). From July 2013 to April 2014, 15,817 new customers were connected through REA projects in rural areas (Muhongo 2014). Across the national territory, TANESCO attained the impressive figure of 243,689 new connections in 2014 (TANESCO 2016b). According to the figures presented by the Minister of Energy to the Parliament, access leaped from the 21% reported by the national census of 2012 to 24, 36, and 40% in 2014, 2015 and 2016, respectively (Muhongo 2014, 2016). The electrification drive stemmed from the new development strategy, the Big

Results Now (BRN) initiative, approved in 2010. BRN set the ambitious goal of connecting 150,000 Tanzanians each year to the national grid. In 2012-13, plans envisaged to connect 80,000 customers in one year (Muhongo 2012). From 2013 through 2014, 138,931 were connected by TANESCO (Muhongo 2014). In 2015, the goal had been increased to 250,000 annually. Between July 2015 and April 2016, TANESCO and REA connected 220,128, a substantial increase (Muhongo 2016). In this wave of connections and projects of rural electrification, Mtwara and Lindi received a disproportionate amount of attention. The year 2012 delivered the electrification of one settlement in the Newala district and, most remarkably, the extension of the grid to Msimbati in Mtwara, the village where gas for the power plant in Mtwara is extracted. In that same year and the next there was a US\$ 3.13 million project by the Rural Energy Fund envisaged to be implemented exclusively in the districts of Mtwara Urban, Kilwa, Lindi, Masasi, Nachingwea, Newala, Ruangwa and Tandahimba to improve electricity supply (Muhongo 2013). Again, in 2013-14 US\$ 3.72 million were spent in Mtwara and Lindi to connect 790 and 1,135 rural customers, respectively (Muhongo 2014). In 2012-13 the Turnkey Phase II projects were conceived, and various projects in Mtwara were included. Nanyumbu, a recently created district capital in the Mtwara region, was also electrified (REA 2014). In a remarkable disparity with the trajectory of REA since its foundation, the 2013-14 financial year yielded nothing less than a project specifically aimed at rural electrification in the Mtwara and Lindi regions (REA 2013b). As of March 2014, 80 kilometres of low voltage lines had been laid, and 966 customers connected of a total of 1,537 planned (REA 2015); in the next financial year, 1,717 additional customers were connected (REA 2016). But rural electrification was not the only benefit that distinguished Mtwara and Lindi from other regions. Crucially, these two regions were graced with a unique feature in Tanzania's energy policies. The MEM granted both regions a temporary reduction in the connection fee. Starting in January 2013, the connection fee for rural customers throughout Tanzania was reduced to TZS 177,000 from the previous rate of TZS 320,960 (Muhongo 2012, 2013). But Mtwara and Lindi were treated even more favourably. In keeping with a self-proclaimed new 'sensitivity [*usikivu*],' the government approved a temporary reduction of the connection fee from 177,000 to 99,000, for those within a radius of 30 metres of the grid, valid from January to June 2013. This provisional reduction was extended twice, first until June 2014 and later until June 2015 (Muhongo 2013, 2014). Even more tellingly, this favourable policy was accompanied by a less formal

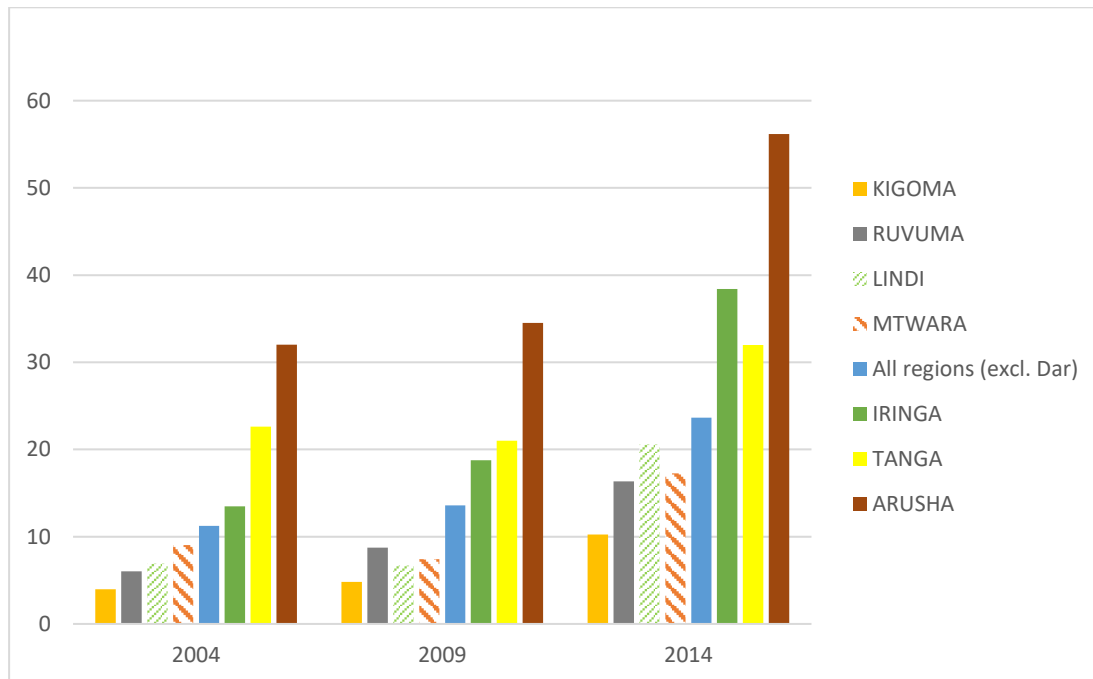
arrangement. To avoid setting off more discontent, TANESCO instructed its Regional Office in Mtwara not to enforce disconnections with customers who accumulated arrears of less than TZS 50,000 (TANESCO Mtwara Regional Engineer 2014).

A quantitative analysis of the expansion of access infrastructure over Mtwara and Lindi also suggests a favourable policy bias in this period. The analysis draws upon three indicators: the number of non-industrial customers per 1,000 habitants (unit: customers/1,000 habitants), the installed capacity of distribution transformers per customer (kilovolt-ampere per customer, kVA/customer), and the density of distribution lines per square kilometre (kilometres of lines/square kilometres). The first indicator is a good proxy for general reach, the second, for penetration over extensive areas, and the third, for the quality of penetration over both urban and rural areas, as overloaded transformers constitute the major bottleneck for adequate supply over an area. The indicators compare Mtwara with a selected number of regions in Tanzania. The latter include peripheries that are similar in income per capita (e.g. Lindi, Ruvuma and Kigoma), more developed regions (e.g. Tanga or Arusha), and regions standing somewhere in between (e.g. Iringa). Moreover, a virtual 'average' region has been added, to account for the regions where TANESCO has deployed lines over extensive (usually rural) areas, but excluding the highly dense Dar es Salaam.

The analysis based on the first indicator shows how Mtwara lagged slightly behind the rest of regions (see figure 26). This is particularly true of the time between 2004 and 2009. However, after that year, and as Mtwara was being reverted to TANESCO, the indicator rose to outpace some of the regions in the panel. The second indicator portrays a major expansion of penetration over the rural areas of Mtwara (see figure 27). From an already advantageous position in 2004, the density of low voltage distribution lines in this region jumped to almost the first position in the panel of regions under comparison. Lastly, the evolution of the third indicator - installed capacity of distribution transformers per customer - indicates the opposite trend (see figure 28). The indicator grows between 2004 and 2009, a period of considerable expansion in the grid in Mtwara by Wentworth and declines later. However, both the expansion of 2004-09 and the drop of 2009-14 contrast with the sharp drop throughout all regions in the panel in Tanzania (an indicator in itself that the growth in access over the last decade has not been accompanied by sufficient investments in equipment and the grid).

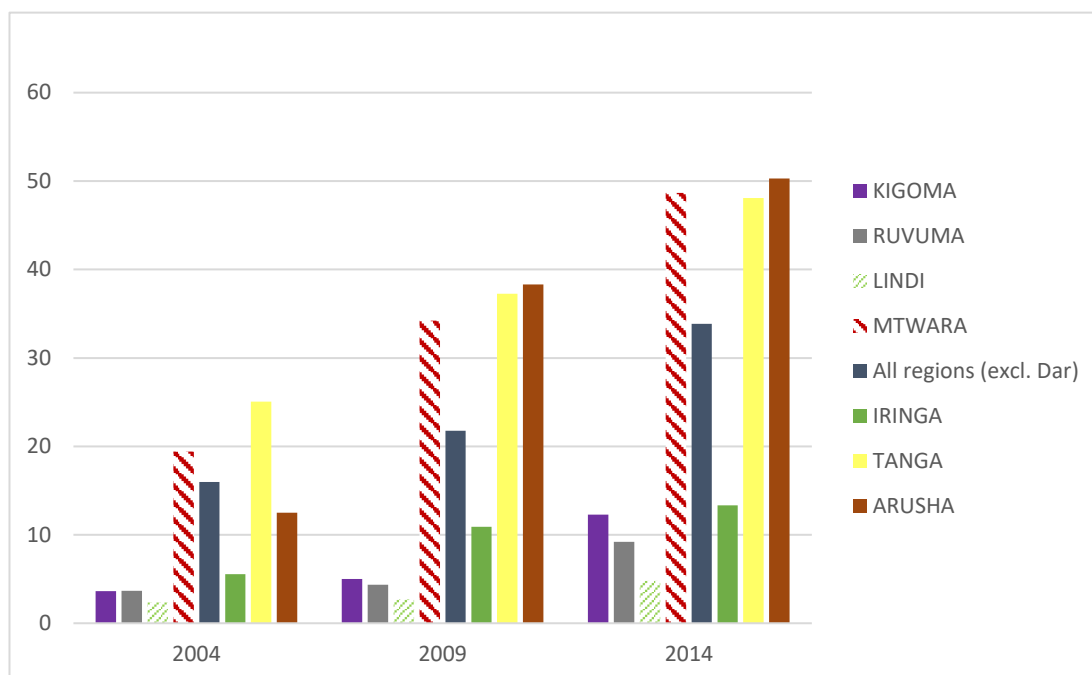
All in all, the evident policy benefits for Mtwara and Lindi demonstrate that the region was subject to special attention from the government (TANESCO South Zonal Manager 2014), a consequence, in the words of a senior informant in TANESCO, of ‘the outcry of the public in Mtwara’ in 2013 (TANESCO Senior Manager Strategic Planning 2014).

**Figure 26: Number of domestic and commercial customer per 1,000 habitants, selected regions of Tanzania, 2004-14.**



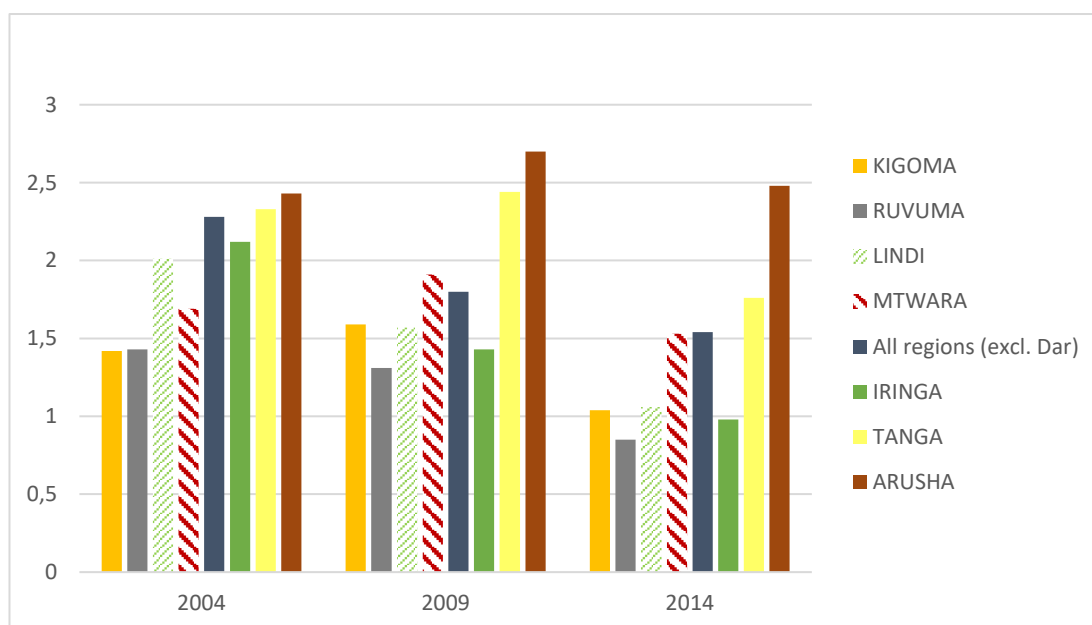
**Source: Unpublished data from TANESCO.**

**Figure 27: Density of low voltage lines (km. lines per sq km.), selected regions of Tanzania, 2004-14.**



Source: Unpublished data from TANESCO.

**Figure 28: Installed capacity of distribution transformers per customer (kVA/customer), selected regions of Tanzania, 2004-14.**



Source: Unpublished data from TANESCO.



#### 4.4.1. Alternative mechanisms I: Ruling out electoral calculations

The evidence above seems to suggest that popular unrest explains to a large extent the change in the Tanzanian government's political electrification strategy deployed in Mtwara and Lindi. The analysis of electoral patterns in the region indicates the same, or at the very least fails to provide a strong case for the search of narrow electoral gains as a driver of spatially targeted electrification in the South East. Indeed, the incentives to use electricity electorally in the South East were limited.<sup>58</sup> With the exception of the last general elections held in 2015, presidential and parliamentary elections both in Lindi and Mtwara were almost invariably carried by the incumbent CCM (see figures below). The 2000, 2005 and 2010 general elections were carried by the incumbent with sweeping majorities of over 60% (Babeiya 2011; Kelsall 2007; O'Gorman 2012). With the support for the ruling CCM declining rapidly, however (see figures 29 to 32), the provision of infrastructure, notably electricity, might have gained electoral salience. Two pieces of evidence seemingly refute this claim: first, the views of TANESCO staff themselves, who downplay the relevance of electorally motivated involvement, in telling contrast to the views of NEDCo in northern Ghana; and second, the analysis of the plausibility of a correlation between the pattern of electrification by district and the potential electoral gains derived from delivering electricity to key constituencies, ie strongholds or swing districts.

As far as the views of TANESCO staff are concerned, electoral concerns seem to have played out more in the micro-politics of each constituency than in a general regional pattern. TANESCO staff working both in the region and at headquarters in Dar es Salaam concede that MPs sought to attain re-election, amongst other means, by convincing their constituencies that they could secure electrification projects for their electors. Indeed, they might go so far as to promise 'free electricity.' This was allegedly the case in Songo Songo, where a local politician supposedly promised that electricity would be supplied to the community for free in exchange for the extraction of gas (TANESCO Manager Electrification 2014). District Councillors played similar cards, particularly in the year elections are held (TANESCO Senior Manager Distribution 2014; TANESCO South Zonal Manager 2014). Sometimes moves of this sort even started in the year before the election, as was reportedly the case during the

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<sup>58</sup> This is not to deny that electrification may have been used for electoral purposes in other regions (Rosenzweig 2015).

fieldwork carried out in 2014. Such pressures were more intense at TANESCO's headquarters, and officers implementing rural electrification projects and TANESCO district managers reported that by and large they were not bothered (TANESCO Masasi District Manager 2014; TANESCO Tandahimba District Manager 2014). Pressures were also felt during the planning cycle, when MPs lobbied TANESCO to include the maximum number of villages in their constituencies on the list of projects of electrification (TANESCO Manager Electrification 2014). Yet, generally, TANESCO staff, at least in public, attributed little impact to the pressure from MPs and District Councillors. One senior informant even justified the pressure not only as fair, but also necessary. She regarded MPs who interested themselves in a certain project to simply be fulfilling their duties of parliamentary oversight with regard to the governmental goal of achieving 30% access by 2015, and 75% by 2025 (TANESCO Senior Manager Distribution 2014). As far as Mtwara and Lindi were concerned, TANESCO staff did recall how REA conceived and funded one project exclusively aimed at electrifying villages in the Lindi and Mtwara regions<sup>59</sup>, as well as the different steps that had been taken to deliver electricity to the communities closer to the gas wells. TANESCO staff also recognized the investments of US\$ 22 million to extend the grid, the 31 rural electrification projects implemented across Mtwara and completed as of mid-2014<sup>60</sup>, as well as the Turnkey Phase II project, to be completed in 2016 across Tanzania, and which planned to electrify thirteen District Headquarters, that brought the grid to Nanyumbu in 2014 (TANESCO Manager Electrification 2014). TANESCO staff also called attention to the fact that the MEM had commissioned TANESCO to survey potential investments in the southeast (TANESCO South Zonal Manager 2014), reportedly as part of a broader effort by TANESCO and the Ministry to connect all villages to the grid before 2016, far beyond the national goal of attaining an access rate of 75

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<sup>59</sup> In Mtwara, the project planned to lay out 47.75 kilometres of low voltage (0.4 kV) distribution lines and connect 916 customers (REA, 2013; 2014). The projects involve REA, TANESCO and the government – but not the Millennium Challenge Corporation, unlike in other regions (TANESCO Newala Acting District Manager 2014). Globally, rural electrification projects across Tanzania from 2013 to 2022 are estimated to require US\$ million 2,063 (IED 2014b, 16). If the project is implemented, Mtwara is envisaged to be completely electrified by 2022 (IED 2014a).

<sup>60</sup> By contrast, the REA Turnkey Phase I project (2011-14) undertook 41 rural energy projects in 16 regions. It envisaged the extension of 1,819 kilometres of medium voltage lines – both 11 and 33 kV - 979 kilometres of 0.4 kV lines, as well as the installation of 438 pole-mounted transformers. Overall, REA estimated that the project will connect 26,434 new customers to the grid, each village connected contributing with an average of 250-400 households – there is no minimum village size criterion. Projects under Turnkey Phase I were finally completed in 2015 (TANESCO Manager Electrification 2014).

by 2025 (TANESCO Mtwara Regional Accountant 2014; TANESCO Mtwara Regional Manager 2014). All in all, TANESCO staff vigorously denied any general electoral pattern in the South East beyond a policy bias in favour of access in Mtwara and Lindi, which they linked to the government's aim of facilitating industrialisation, but also as a response to the events of 2012.

Against this background of governmental response to expressed infrastructural grievances, an analysis of the possible correlation between electoral and electrification patterns by districts hardly shows any recognizable pattern. Unfortunately, there is no data available about access to electricity disaggregated by district after 2012. This makes it impossible to compare the expansion of access to electricity in the period after the events of 2012 with the electoral results of 2010 and 2015, which might point to a changing distribution of swing and stronghold districts. Regrettably, the presence of electoral calculations after 2012 can only be extrapolated from the existing patterns before that year. Another important variable for the analysis of electoral patterns is population density. Tables 21 and 22 show the population densities by district in the Mtwara and Lindi regions, as presented in the census of 2012.<sup>61</sup>

**Table 21: Population density of Mtwara region, by district, 2012.**

| District         | Population (people) | Population in largest settlement (people) | Size (km <sup>2</sup> ) | Density (people/km <sup>2</sup> ) |
|------------------|---------------------|---|-------------------------|-----------------------------------|
| Mtwara Municipal | 108,299             | 108,299                                   | 169.9                   | 637.4                             |
| Masasi Urban     | 102,696             | 102,696                                   | 753.35                  | 136.3                             |
| Tandahimba       | 227,514             | 20,569                                    | 2,048.56                | 111.1                             |
| Newala           | 205,492             | 20,740                                    | 1,952.68                | 105.2                             |
| Masasi Rural     | 247,993             | 27,908                                    | 4,005.91                | 61.9                              |
| Mtwara Rural     | 228,003             | 13,320                                    | 3,692.06                | 61.7                              |
| Nanyumbu         | 150,857             | 18,629                                    | 5,203.54                | 29.0                              |

**Source: 2012 Census (NBS 2016b).**

<sup>61</sup> Only 2012 is considered for demographic data, as changes with respect to 2002, particularly in the relative positions between districts, are negligible.

**Table 22: Population density of Lindi region, by district, 2012.**

| District        | Population (habitants) | Population in largest settlement (people) | Size (km <sup>2</sup> ) | Density (people/km <sup>2</sup> ) |
|-----------------|------------------------|---|-------------------------|-----------------------------------|
| Kilwa           | 190,744                | 13,601                                    | 15,000                  | 12.72                             |
| Lindi Rural     | 194,143                | 13,304                                    | 5,975.3                 | 32.49                             |
| Nachingwea      | 178,464                | 16,592                                    | 5,975.21                | 29.87                             |
| Liwale          | 91,380                 | 8,651                                     | 34,313.54               | 2.66                              |
| Ruangwa         | 131,080                | 11,257                                    | 2,515.6                 | 52.01                             |
| Lindi Municipal | 78,841                 | 78,841                                    | 1,063.52                | 74.13                             |

**Source: 2012 Census (NBS 2016b).**

Tables 19 and 20 indicate how, generally speaking, districts in the Mtwara region ought to have been prioritized for electrification, by comparison with those in Lindi, in keeping with the higher population densities of the former. According to the data in the table, in the Mtwara region only Tandahimba received disproportionate attention, judging by the increase in the access rate above the regional average. The increase in Mtwara Rural is not significant in absolute numbers, compared with the higher absolute increases in other districts of the region with similar populations and densities. In the Lindi region, Kilwa, Lindi Rural, Liwale and Ruangwa were subject to electrification with an intensity higher than the regional average. It is worth noting that in both regions the regional capitals received comparatively little attention between 2002 and 2012, with the obvious exception of the construction of the power plant in Mtwara town.

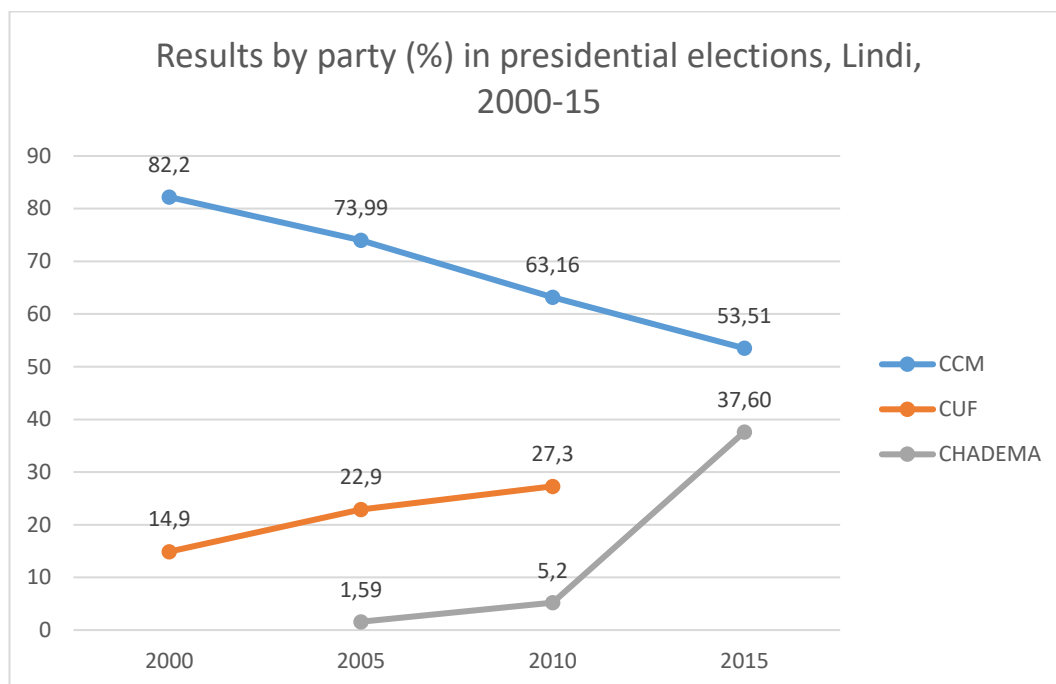
An analysis of the correlation between electoral patterns and electrification must consider two possible strategies by the incumbent: ‘The incumbent party may choose to direct resources to areas that lean towards or away from itself, or to areas that are evenly split’ (Briggs 2012, 608). That is, the incumbent may decide to reward strongholds, punish strongholds of the opposition or target swing districts. According to the data synthesized in the figures below and table 23, virtually all districts in Mtwara and Lindi regions were strongholds of the CCM before 2015, with the only exception of Mtwara Municipality, Kilwa South (Kilwa Kusini) and Liwale. Districts that, according to the electoral data in the parliamentary elections of 2015 (but not always in presidential elections), party strategists could have anticipated in 2004-12, with considerable foresight, as disputed or swing districts,

also include Ndanda, Tandahimba and Mchinga. It should be borne in mind, however, that at the time covered by the statistics about electrification, 2002-2012, it would have required very remarkable prospective capacities to anticipate the changes in 2015 in the three seats mentioned.

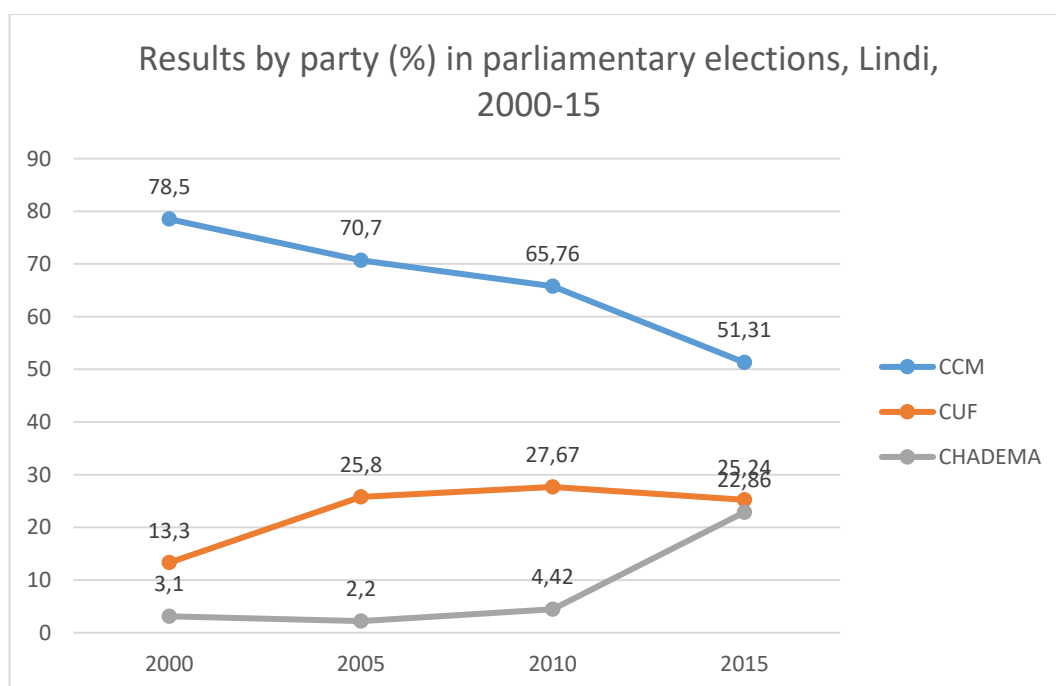
Overall, CCM secured broad margins vis-à-vis the *Chama cha Demokrasia na Maendeleo* (CHADEMA) and the Civic United Front (CUF) also in Lindi and Mtwara (see figures 29 to 32). Apparently, therefore, CCM had little incentive to mobilize infrastructural investments in the region electorally. In the parliamentary elections of 2005, all seats were won by the CCM. In 2010, in Mtwara all seven constituencies were held by the CCM. In those elections, only Kilwa Kusini and Luwale in Lindi fell for the first time behind CUF. Interestingly, after the first expressions of gas-related unrest in 2010, the ascendancy of CCM started to decline. In the municipal elections of November 2014, the opposition coalition carried 53 seats, and the ruling CCM 58.<sup>62</sup>

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<sup>62</sup> Source: <https://www.africaresearchinstitute.org/newsite/blog/how-will-tanzanians-vote-on-sunday-25-october/> (accessed February 23, 2017).

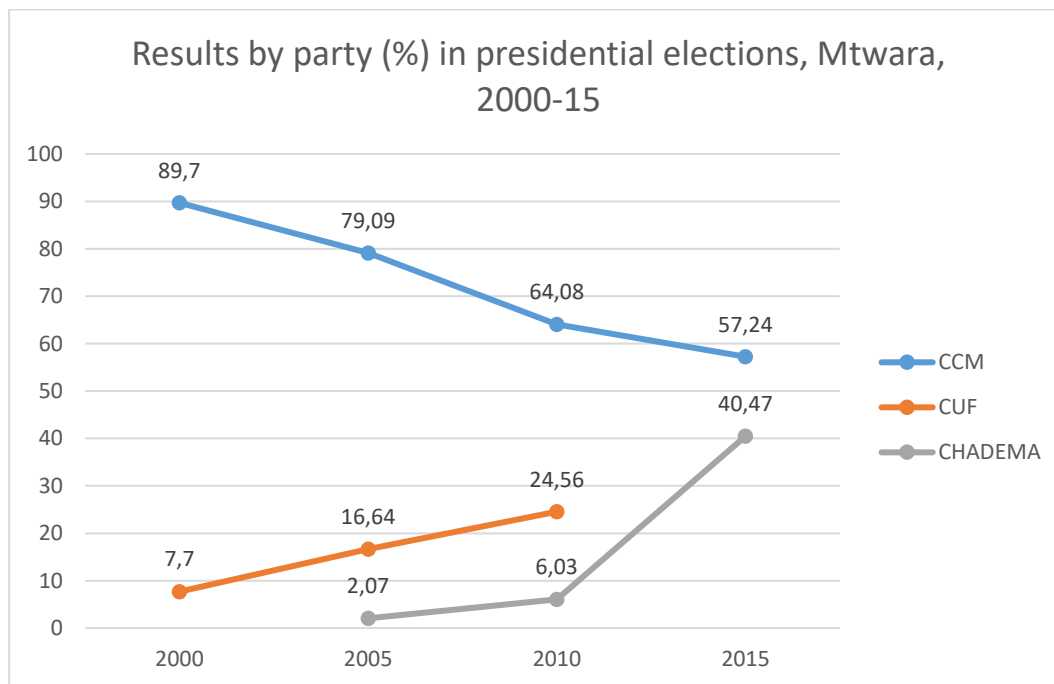
**Figure 29: Trends in presidential elections in Lindi, 2000-15.**

Source: Killian (2007) and Gazette of the United Republic (2016).

**Figure 30: Trends in parliamentary elections in Lindi, 2000-15.**

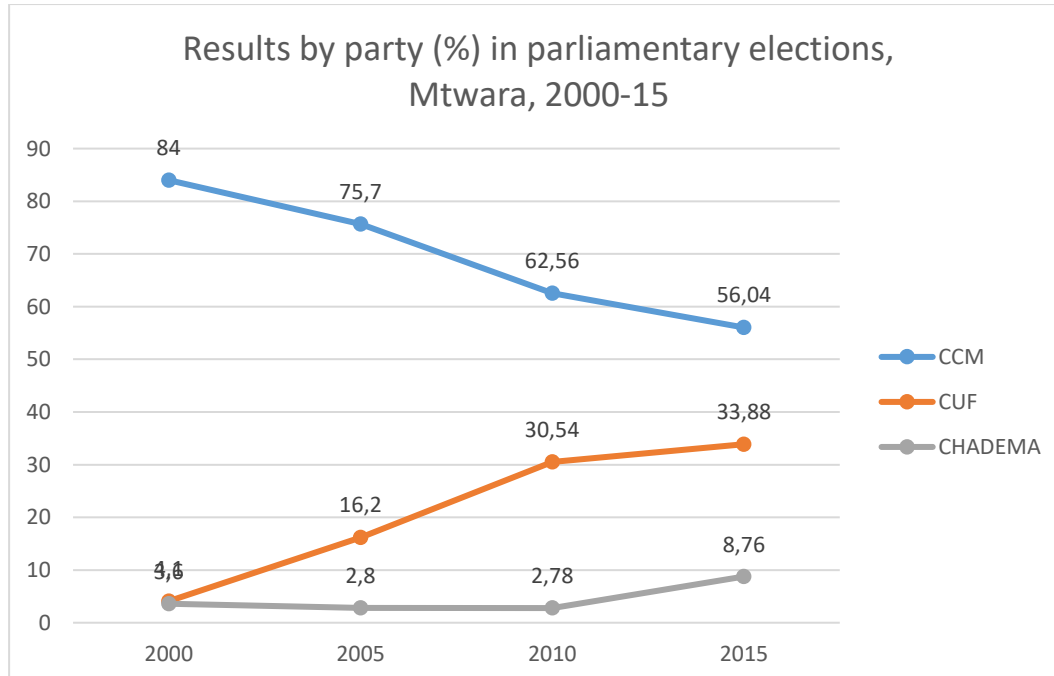
Source: Killian (2007) and Gazette of the United Republic (2016).

**Figure 31: Trends in presidential elections in Mtwara, 2000-15.**



Source: Killian (2007) and Gazette of the United Republic (2016).

**Figure 32: Trends in parliamentary elections in Mtwara, 2000-15.**



Source: Killian (2007) and Gazette of the United Republic (2016).

**Table 23: Winner by constituency of presidential and parliamentary elections in Mtwara and Lindi, 2010-15.<sup>63</sup>**

| Region | Constituency    | Presidential |             | Parliamentary |         |
|--------|-----------------|--------------|-------------|---------------|---------|
|        |                 | 2010         | 2015        | 2010          | 2015    |
| Mtwara | Lulindi         | CCM          | CCM         | CCM           | CCM     |
|        | Masasi Mjini    | CCM          | CCM         | CCM           | CCM     |
|        | Mtwara Mjini    | CCM          | CHADEMA/CUF | CCM           | CUF     |
|        | Mtwara Vijijini | CCM          | CCM         | CCM           | CCM     |
|        | Nanyamba        |              | CCM         |               | CCM     |
|        | Nanyumbu        | CCM          | CCM         | CCM           | CCM     |
|        | Ndanda          |              | CCM         |               | CHADEMA |
|        | Newala Mjini    | CCM          | CCM         | CCM           | CCM     |
|        | Newala Vijijini |              | CCM         |               | CCM     |
|        | Tandahimba      | CCM          | CCM         | CCM           | CUF     |
| Lindi  | Kilwa Kaskazini | CCM          | CCM         | CCM           | CUF     |
|        | Kilwa Kusini    | CCM          | CHADEMA/CUF | CUF           | CUF     |
|        | Lindi Mjini     | CCM          | CCM         | CCM           | CCM     |
|        | Liwale          | CCM          | CHADEMA/CUF | CUF           | CUF     |
|        | Mchinga         | CCM          | CCM         | CCM           | CHADEMA |
|        | Mtama           | CCM          | CCM         | CCM           | CCM     |
|        | Nachingwea      | CCM          | CCM         | CCM           | CCM     |
|        | Ruangwa         | CCM          | CCM         | CCM           | CCM     |

**Source: National Electoral Commission and Gazette of the United Republic (2016).**

The analysis of electoral patterns in 2010 and 2015 fails to show any clear pattern. If CCM had decided to reward its strongholds, so many candidate districts were available that it is difficult to ascertain the rationale used to put emphasis on just a few of them. Conversely, CCM certainly did not opt to punish the strongholds of the opposition, as Kilwa and Liwale are clear counterexamples. At the same time, the supposed preference accorded to Tandahimba, Kilwa and Liwale hardly qualifies as a clear case of targeting swing districts. The case of Liwale is telling. This district might have been prioritized in rural electrification but at the same time it can be concluded that its capital was somehow punished, as despite being one of the fourteen district capitals in Tanzania that was still un-electrified, ie disconnected from the grid (TANESCO Manager Electrification 2014) as of 2014, it was not connected to

<sup>63</sup> Only the three biggest parties, which altogether invariably mustered at least 95% of the votes cast, are represented. In Mtwara, Nanyamba and Ndanda were created for the 2015 general election, and Newala split into Newala Mjini [Urban] and Newala Vijijini [Rural]. In the same elections, CHADEMA and CUF, and other parties, formed a coalition for the presidential contest.



the grid. Tandahimba also received above-the-average attention, but the starting point in this district was so low that any minor effort towards electrification would necessarily render a significant rise in the access rate. Kilwa, by contrast, is a good candidate as a district privileged with more electrification due to its condition of swing district between the 2010 and 2015 elections. This district was also disputed in 2010, as the victory of CHADEMA/CUF in the presidential elections of 2010 reveals. Lastly, it is also revealing that swing districts in 2010 and 2015 were both urban and rural, making it more difficult to any political administrator to choose between rural and urban electrification on the grounds of purely potential electoral wins. If any, the only substantial investment in the vicinity of the 2015 election was the extension of the grid to Nanyumbu, one of the non-electrified district capitals, and also a CCM stronghold. Whether the extension to Nanyumbu could also respond to a strategy of rewarding a stronghold is impossible to elucidate, given, again, the large number of electoral districts in Mtwara and Lindi that could be candidates for infrastructural rewards in exchange for being incumbent strongholds. In short, no clear pattern linking electrification and strongholds or swing districts emerges from the analysis below. At the same time, electrification in Lindi overlaps with two opposition strongholds. The presence of electoral calculations cannot be presumed, but it cannot be ruled out either. By comparison with the salience of infrastructural grievances before 2012, the latter appears as a stronger candidate as a driver of changes in the territorial strategy of electrification after 2012. The next section assesses the plausibility of regional economic reengineering as a force for policy change around 2012.

#### **4.4.2. Alternative mechanisms II: Regional economic reengineering**

As regional economic reengineering is concerned, the starting point is the realisation that state actors in Dar es Salaam and Mtwara have managed to influence the perceptions of a variety of stakeholders in the South East. Thus stakeholders as such agree with the government that the foremost developmental strategy for the region must be attracting foreign investors, which will in turn create jobs and business opportunities for the locals. Even more importantly, non-state stakeholders express few doubts, if any, about the notion that Mtwara will develop considerably in the coming decades. All this speaks to the success of the Tanzanian state in attracting non-state actors to a shared understanding of the

aspirational development strategy for the south east, by means of consolidating a solid policy coalition between the state and non-state actors. Of utmost relevance in this regard is the creation of a discursive coalition (Bosman et al. 2014; Harris 2013; Hess 2014; Sabatier 1988, 2007). The argument is illustrated with the views of state actors, development practitioners and other stakeholders operating in Mtwara region. The considerable degree of coherence in the views of state and non-state stakeholders is offered as a proof of success by the state in building a solid discursive coalition of statebuilders.

The existence of this discursive coalition is reflected in a number of narratives extending from the diagnosis of the problems to the solutions. The first narrative acknowledges an epochal change in the capacity of the Tanzanian state to deliver positive social change in Mtwara. This narrative of state-led development is nurtured by an extensive network of state officials in the local and regional administrations, as well as by development practitioners. In this narrative, gas is the game changer. State officials and development practitioners alike agree that Mtwara is growing and developing, especially in comparison with a few years ago (Mtwara District Head of Planning 2014; TANESCO Senior Manager Distribution 2014). An abundance of gas-spurred investment projects has ushered in a new era for the region (Mtwara Rural District Engineer 2014; TCCIA Information Officer 2014). Proof of that is the number of companies that over the last decade have reached a certain threshold of tax payment and have been transferred to the Large Taxpayers Unit in Dar es Salaam (TRA Mtwara Regional Manager 2014).<sup>64</sup> The business sector has also improved. The opportunities opened up by the incoming investments are trickling down to a growing demand for food (Mtwara District Head of Planning 2014). Mtwarans can now expect to derive some benefits, even if indirect, in jobs for infrastructure construction (TCCIA Information Officer 2014), including: lower living costs, thanks to projects such as the Dangote cement factory (Mtwara Rural District Engineer 2014); access to products from other regions (TCCIA Information Officer 2014); a surge in the price of land (TANROADS Mtwara Regional Manager 2014); and the flocking in of more and more professionals eager to settle in Mtwara (TCCIA Information

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<sup>64</sup> TRA nonetheless estimates that it is able to collect only 70-75% of the region's potential revenue. This fact is attributed to low taxation by the government and the fear of both the latter and MPs to raise taxes. Over 70% of regional revenue is accrued from Mtwara town. This provides an indication of the relatively low income derived from cashew nut production in rural areas – even if considering the existence of the Export Levy, even though it is only paid for a few months, from October to January (TRA Mtwara Officer 2014).

Officer 2014). For government officials, the government is specifically addressing the problems of southeastern Tanzania, especially in those areas along the pipeline under construction from Mtwara to Dar es Salaam. Compensatory benefits include schools and vocational training centres (MEM Tanzania Assistant Commissioner Energy Development 2014). With upcoming development, public administrations in the Mtwara will benefit from higher revenue streams, consequently improving service delivery for the villages (Mtwara Rural District Engineer 2014). Indeed, the latter is already underway to a certain extent thanks to the work of the government hand in hand with communities at the grassroots and through District Councillors. And in crucial areas such as road construction, the District administration is also working hand in hand with the Prime Minister's Office and the Tanzania National Roads Agency (TANROADS) (Mtwara District Head of Planning 2014). All in all, the gap between Mtwara and the rest of Tanzania is already shrinking (Mtwara Regional Administrative Secretary 2014), amongst other reasons, because of accessibility by road (Mtwara Rural District Engineer 2014). Mtwara is poised to grow faster than other territories of Tanzania. Indeed, for some Mtwara is being no less than re-invented (TANESCO South Zonal Manager 2014). Due to the anticipated investments fuelled by gas discoveries, the region has become strategic for the Tanzanian government (Mtwara Regional Administrative Secretary 2014). Local authorities anticipate returns of up to US\$ 1 billion (Mtwara District Head of Planning 2014). The rural communities are also expected to reap the benefits of gas in the form of communication infrastructures, making remoteness history (Devt. Pract. 10 2014). Even Non-Governmental Organisations find the region more attractive to set up regional offices – instead of in Dodoma – because of the availability of funding from gas companies (Devt. Pract. 2 2014).

The narrative extolling state-led development does not downplay the fact that Dar es Salaam persistently neglected the South East for decades nor the scant results of the allegedly limited investments in the region, e.g. in the transformation of cashew nuts (Devt. Pract. 10 2014; Devt. Pract. 2 2014; TCCIA Information Officer 2014). Indeed, it is broadly acknowledged that as Mtwara was perceived as a remote region with scant resources to exploit, it did not attract outside investments. Under the Germans, the Maji-Maji uprising discouraged public investments in the south (Devt. Pract. 7 2014). Later on, under British rule, ill-conceived public interventions, the most salient amongst them the Groundnut Scheme, hindered the region's development (Devt. Pract. 10 2014). And after independence, the leadership of

independent Tanzania deployed only timid efforts to intervene in the South East (Devt. Pract. 7 2014). Post-independence rulers also made critical mistakes, notably in infrastructure. One such error was the decision to uproot the railway line connecting the cashew nut-growing area around Nachingwea with the port of Mtwara (TEMESA Mtwara Regional Manager 2014).

The second narrative premises development in the region on a strategy of whetting the appetite of outside investors. Once outside investments are accorded priority through exploitation by local capital, foreign companies already in the region, like British Gas, Statoil or Dangote, may contribute developmental outcomes such as roads, water supplies, or educational facilities (Devt. Pract. 3 2014). Rural dwellers supposedly contemplate benefits mainly from the gas industry and the cement factory (Devt. Pract. 5 2014). Additionally, the logistical requirements of a mineral economy may bring about new infrastructure, tackling the shortages identified earlier. The argument is aptly illustrated by the prospective railway link connecting Mtwara and Lake Malawi. The benefits of a railroad line along the Mtwara Development Corridor would be more than just material though. The line would duly redress another infrastructural grievance: the uprooting in 1962 of the railway that since 1954 plied the route from Nachingwea to Mtwara harbour (TANROADS Mtwara Regional Manager 2014). Moreover, transnational companies' corporate social responsibility schemes would activate the communities by engaging them in the delivery of social services. Indeed, something along those lines is already taking place (Devt. Pract. 5 2014; Mtwara District Head of Planning 2014). The economic advantages for the region would have a correlate in Mtwara town. In the latter case, the expression attracting foreigners acquires a literal sense. If gas is exploited by foreign companies, demand for accommodation for temporarily-settling expats and fellow Tanzanian, ie hotels and high-rise buildings, can only be expected to soar. A cognate logic applies to the demand for warehouses. In fact, the Mtwara Municipality is already flooded with applications asking for a change in use category, from residential to hotel, all over Mtwara (Mtwara Municipality Acting Municipal Director 2014). Construction is booming, as hotels and housing are still in short supply (Devt. Pract. 10 2014). Opportunities for local business may also arise: feeding temporary residents with chickens and crops sourced from the region; or with cashew nuts, with small and medium enterprises also playing their role (Devt. Pract. 3 2014; TCCIA Information Officer 2014). The potential benefits are not exclusively material; they are also cultural. Exchange between Mtwarans and foreigners can countervail the cultural gap noted above (Devt. Pract. 9 2014); a culturally and

economically richer Mtwara will inevitably entice more investors. For that purpose, though, the government must not only put in place the right policies, but also implement them. For a start, it needs to coordinate public initiatives in the region better (Dev. Pract. 2 2014). In the terrain of sound policies, the government must facilitate a conducive business environment (TCCIA Information Officer 2014). Prior to all that, nevertheless, the government must deliver trained manpower, facilities and other technical inputs, in particular to improve planning capacities for 'guided development' (Mtwara Regional Administrative Secretary 2014). The administration must also address the infrastructural deficit by means of a construction programme fine-tuned to boosting economic activity. Lastly, the government must intervene directly in markets, e.g. with subsidies to crops (TANROADS Mtwara Regional Manager 2014), or schemes to patronize local markets (TANESCO Mtwara Electrician 2014). Above all, it needs to act decisively and abandon 'politicking' (Dev. Pract. 4 2014). Few room is left for alternative strategies to attract investors. At most, they are presented as complementary. The only exception is education, which for many is paramount (Dev. Pract. 9 2014), if only to nurture cultural exchange (Dev. Pract. 4 2014). Apart from education, though, tourism development in spots like Mikindani is deemed a complement to the arrival of foreigners (Mtwara Municipality Acting Municipal Director 2014). Similarly, fishing, if transitioning from the use of dynamite to appropriate nets and bigger ships, may also provide residents with the means to make decent livelihoods (Dev. Pract. 3 2014). Indigenous industries such as tourism and fishing, however, lose out to investor-led, gas-driven industrialisation. Overall, the strategy of attracting investors aligns neatly with the vision of the national government seeking to further industrialisation.<sup>65</sup> This national vision echoes locally with people across the board (Mtwara Municipality Acting Municipal Director 2014; TANESCO Mtwara Electrician 2014; TCCIA Information Officer 2014). To materialize the plans, authorities draw with alacrity on the example of eastern and southeastern Asia. Allegedly, the south-east Asian experience shows how Singapore and China appointed the best technicians - meaning engineers - to positions of responsibility as a means to achieve excellence in company management, irrespective of public or private ownership (Mtwara Regional Commissioner 2014).

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<sup>65</sup> See Tanzania's National Development Vision 2025, and its sequel the Big Results Now Initiative at <http://www.mof.go.tz/mofdocs/overarch/THE%20TANZANIA%20DEVELOPMENT%20VISION%202025.doc> (accessed May 19, 2016).

Characteristically, public authorities also frame the narrative of enticing investors as an opportunity to re-build Mtwara according to the principles of rational planning. To achieve this, the Master Plan must rationally determine the future location of big industries, storage infrastructure, health facilities, and the like in the shape of 'concentric cities' (Mtwara Municipality Acting Municipal Director 2014). In preparation in 2014, the Master Plan for the Mtwara and Mikindani Municipality will rewrite the future of the city and its 'satellites' for the coming twenty years. The whole process was set off by the declaration of all Mtwara as a 'planning area' (Mtwara Municipality Acting Municipal Director 2014). Underlying this is a municipal policy to increase plot density. In the draft plan 50% of envisaged plots are planned as high density plots, 30% as medium density, and 20% as low density. This typology is crucial, as providing services is both more economic and easier in high density plots, ie 'economic cities' (Mtwara Municipality Acting Municipal Director 2014). Higher densities are greatly beneficial to the public administration, with the only downside of potential security threats. In rural areas densification is already happening, even though the number of villages keeps growing. Densification today is being pushed by different means than in the 1970s, without the need to coerce rural dwellers (Mtwara District Head of Planning 2014; Mtwara Municipality Acting Municipal Director 2014; Mtwara Regional Administrative Secretary 2014). Hopefully, access to electricity will contribute to curtail migration to urban areas (TANESCO Senior Manager Distribution 2014).

The third narrative presents Mtwara in the future as enjoying the same amenities as Dar es Salaam (Dev. Pract. 5 2014). Mtwara is presented as outperforming Lindi, in spite of the latter's historical primacy (Dev. Pract. 2 2014). To materialise this goal, however, some prerequisites need be met. The municipality, for instance, bases Mtwara's development on a refashioning which draw on the notions of 'cluster models', 'economic cities' and 'concentric cities'. This is the vision embodied in the upcoming Mtwara Green City Master Plan. The 'cluster model,' for instance, entails bracketing same-sector industries together into spatial clusters: a petrochemical cluster in Msangamkuu, in the vicinities of Msimbati, where gas is processed for distribution; a logistics park nearby the port, currently underutilized; and a general industry cluster, as well as probably a building cluster, in areas yet to be designated. Additionally, the municipality deems inevitable to develop the new, already designated, residential areas. If developed, those areas will drive up the demand for utilities, namely water and electricity. The Mitengo area is a good example (Mtwara

Municipality Acting Municipal Director 2014). Finally, if the plans conceived by the government to build infrastructure materialize, Mtwara will enjoy a plethora of roads reaching out toward the west and the south, a harbour tying the region to the Far East (Mtwara Regional Administrative Secretary 2014), a railway line that will spur mining and agriculture, and many industries (MEM Tanzania Assistant Commissioner Energy Development 2014; TANROADS Mtwara Regional Manager 2014). An indication of the positive effect of infrastructure is that the districts cut by the road to Ruvuma are already better off, and will remain so, in terms of accessibility, electricity coverage, and attention to their demands by political leaders (Dev. Pract. 2 2014). This infrastructural sub-narrative neatly aligns with oft-quoted hopes prompted by the ongoing Mtwara Development Corridor. The need to haul along the Corridor, and ultimately export, coal and iron from Liganga, Iringa and Songea is expected to yield a logistics park in Mtwara. The benefits of this and other clusters will trickle down to the region according to a multiplier effect, in the form of bigger markets for the farmers from the hinterland (Mtwara Municipality Acting Municipal Director 2014). This vision of a future beacon of industrialisation overlaps to a large extent with views couched in cognate terms by TANESCO staff. In this case, it is the availability of power that will entice industries to open factories in Mtwara, to the economic and social advancement of locals (TANESCO Senior Manager Strategic Planning 2014). The rural areas will also benefit, particularly by means of additional employment opportunities. As regards the specific interests of TANESCO, electricity consumption will increase by leaps and bounds, if proper marketing techniques, such as promotions for customers, are put in place (TANESCO Newala Acting District Manager 2014). The upcoming 400MW plant in Mtwara, even though serving the Southern Zone first, will also contribute to stabilize the supply of electricity across the totality of Tanzania. Even beyond southern Tanzania, the abundance of gas-produced electricity will turn Mtwara into the powerhouse of Tanzania (Mtwara Municipality Acting Municipal Director 2014; Mtwara Regional Administrative Secretary 2014). This narrative of Mtwara as a powerhouse resonates with developmentalist claims about the Mtwara Development Corridor, which stretches from Mbamba Bay to Mtwara across all Ruvuma Region, and which will be in further demand of electricity (Mtwara Municipality Acting Municipal Director 2014).

All of the former does not deny or downplay the current challenges in the region but tends to highlight the improvements that the state has already managed to make. The dismal

current condition of rural roads is a stark reminder of the paucity of investments by the Tanzanian state (Devt. Pract. 3 2014; Devt. Pract. 4 2014; Devt. Pract. 5 2014). Despite the discovery of mineral riches, large tracts of the region are inaccessible either due to the lack of all-weather roads or poor maintenance (Mtwara District Head of Planning 2014; Mtwara Rural District Engineer 2014) – unsurprisingly, TANROADS staff think otherwise (TANROADS Mtwara Regional Manager 2014). The dearth of infrastructure is even more striking after the whopping discoveries of gas (Devt. Pract. 7 2014). The discontent with the status of roads in the region turns to bitterness when compared with the avowedly better condition of the roads in northern Tanzania. According to one well-informed interviewee, in the north most rural roads are tarmacked, unlike in Mtwara (TEMESA Mtwara Regional Manager 2014). Roads, however, are not the only sector in dire straits. The list is extensive, and comprises poorly-equipped hospitals, under-staffed schools, low-yielding agriculture and limited financial services. It is only Mtwara town that is endowed with relatively adequate infrastructure, in particular educational facilities (Devt. Pract. 3 2014). Nonetheless, informants, particularly state officials, acknowledge recent efforts by the state, embodied in the major infrastructural breakthrough in the region: the tarmac road uniting Mtwara and Dar, opened during the second term of Benjamin Mkapa's presidency in 2000-05. The road is said to be a blessing for the region (Mtwara Regional Administrative Secretary 2014). The 970-meter-long Mkapa Bridge over the Rufiji River, the longest bridge in Tanzania, eventually closed the era when the south-east was like an 'island' (Devt. Pract. 9 2014). The two daily flights with Dar es Salaam did likewise. The challenges that persist are exemplified by the public lighting system inaugurated in early 2014, and laid out along the new ring road encircling Mtwara town. The public lights were erected with the financial assistance of the World Bank and, revealingly, connected by TANESCO to the grid under pre-payment meters. Upon inauguration, the Municipality found itself short of a budget to pay for the electricity and later the Regional Office refused to foot the bill. As a result of the pre-payment technology, non-payment automatically switched the lights off. They remained so throughout the rest of 2014. Interestingly, budgetary investments in infrastructure as the former, especially in rural areas, are linked to a sort of social contract between citizenship and state. For the most senior public servant in the region, if the government fails to invest in rural areas, locals do not see the yields of their contribution to the public coffer (Mtwara Regional Administrative Secretary 2014).



In other aspects, historical neglect has exacted a heavy toll on the prospects of development of southeasterners. Thereby, the region remains deficient in skilled teachers, especially in science subjects (Dev. Pract. 3 2014), with the result that dropout in primary schools remains high and students' performance deteriorates. The low level of education is directly connected to a protracted dearth of education facilities, most of them rural schools with limited accessibility (Dev. Pract. 10 2014). Indeed, insufficient education is both a cause and a consequence of underdevelopment. A powerful narrative associates insufficient levels of education to purported backward personal and social attitudes (TCCIA Information Officer 2014). One oft-cited example is the unwillingness of many parents to send their children to school beyond a certain age. The consequences of the low level of education are many, but one of them is that politicians cunningly take advantage of the current situation to seed confusion in local populations about economic opportunities and investments (Dev. Pract. 2 2014). Mtwara was for decades deemed in all of Tanzania as devoid of the amenities that render modern life bearable. Anecdotal as it may be, some cite that not so long ago electric appliances were rare in Mtwara town, due to voltage instability (TEMESA Mtwara Regional Manager 2014). More importantly, financial services also were, and continue to be, scarce. Not in vain, Mtwara and Lindi rank among the bottom four regions in access; in Mtwara 70% of the population is excluded from financial services, compared to a national average of 54% (Dev. Pract. 10 2014). More relevantly, the overall perception of backwardness is demonstrated by the attitude of civil servants in the past, who only reluctantly accepted posts in the region. Even today, one development practitioner referred that upon his assignment to Mtwara town his colleagues from Mbeya lamented his transfer to the area, as they perceived Mtwara as a region without the amenities found elsewhere in Tanzania (Dev. Pract. 2 2014).

Last but not least, Mtwara is portrayed as marginalized in the Tanzanian political process. Explanations of political marginalization put forth that the central government gives short shrift to Mtwara because most of its members are northerners (Dev. Pract. 6 2014; TEMESA Mtwara Regional Manager 2014). They also point to the low quality of leadership in Mtwara itself, e.g. representatives who fail to stand for their electors (Dev. Pract. 7 2014). Limited political weight is also attributed to the lack of organizational platforms that may convey the concerns of Mtwarans to the government (Dev. Pract. 10 2014), notably opposition parties, whose behaviour often mirrors some negative aspects of the ruling party (Dev. Pract. 3

2014). Also, scarce interaction between the government and the governed causes decisions to be top-down and willy-nilly (Dev. Pract. 3 2014; Dev. Pract. 9 2014). Another result is low motivation to participate, demonstrated by electoral abstention particularly amongst the youth, as well as a professedly patriotism that dwindles amongst locals due to local political leaders' lavish expenses (Dev. Pract. 3 2014). The political marginalization in Mtwara is further exacerbated by the administrative challenges experienced by regional and local bureaucracies in the region. Chief amongst them is insufficient funding. To start with, the bulk of resources made available for districts originates from the government, which eventually hinges on donors. Accordingly, planning exercises are inevitably uncertain. Even when funds have been assigned by the central government, they may not be readily disbursed. Even more, expenses are not always properly forecast. Indigenous contributions to district budgets, of which the crop cess is the most significant, are rather inconsistent. Thus, the crop cess fluctuates annually in line with the vagaries of the yield of the cashew nut harvest (Mtwara District Head of Planning 2014).

Avowed "objective" challenges are accompanied by a major subjective, cognitive challenge to development. This subjective challenge concerns alleged traditional attitudes conducive to underdevelopment. Equating traditional attitudes with underdevelopment, this narrative argues that educational shortcomings and limited cultural exchange reproduce backward attitudes, both personal and social. The epitome of backward attitudes is laziness and a disinclination to sacrifice (Mtwara District Head of Planning 2014; Mtwara Rural District Engineer 2014; TCCIA Information Officer 2014). For not a few Christians, the latter is explained by Islamic values (Dev. Pract. 3 2014; Dev. Pract. 6 2014) thus the alleged contrast in attitudes is almost self-evident between the 'coastal', Islamic culture and the so-called Christian hinterland (Dev. Pract. 8 2014). In this narrative of attitudinal backwardness, 'traditional' and productive attitudes overlap spatially with the coast and the hinterland. Indeed, for some the coast-hinterland gap stretches well beyond Mtwara along the entire coast of Tanzania (Mtwara District Head of Planning 2014). Allegedly, this gap between the coast and, say, Masasi or Tandahimba (TCCIA Information Officer 2014), is largely cultural, albeit also nutritional and edaphological. The gap also overlaps with the divergent identities and interests of fishermen and peasants (Dev. Pract. 10 2014). Purportedly, in the coastal communities near Mtwara gas is the utmost priority, vis-à-vis farming in the hinterland (Dev. Pract. 3 2014). In fact, if the coast is crippled by the lack of infrastructure it is in part due to

the reluctance of oft-times Muslim fishermen to contribute to public projects, be it in communitarian work or in cash (Mtwara Rural District Engineer 2014). Even though in most coastal villages, this narrative goes, there is a primary and sometimes a secondary school, dropout rates are high, as children are reportedly asked by their families to earn money at an early age. Given this environment, the reproduction of the lack of education in the next generation can hardly be ignored (Devt. Pract. 8 2014). If peri-urban areas along the coast exhibit pro-developmental attitudes, it is because of the exemplary influence of Mtwara town (Mtwara District Head of Planning 2014). Crucially, Mtwara town is said to be developing because of the presence of Christians that arrive(d) from the rest of Tanzania (Devt. Pract. 3 2014). In addition, the narrative of the divide between coast and hinterland divide sustains that the latter is home to starkly different attitudes. Agricultural entrepreneurs in Masasi illustrate how pockets of locals no longer remain 'in darkness' and are, in fact, becoming increasingly ambitious (Devt. Pract. 7 2014). Villagers in the hinterland are also changing their attitudes, helped by the vicinity of roads, which are considered a proxy for cultural exchange (Mtwara District Head of Planning 2014). In this narrative, some groups are growingly aware of the emerging opportunities, and they are acquiring a finer grasp of the nuances of (gas-driven) development (TANROADS Mtwara Regional Manager 2014). It is not culture that explains the gap between coast and hinterland, but rather prosaic material conditions. In this narrative, the coast versus hinterland narrative needs be taken with a pinch of salt.

Narrative of present objective and subjective challenges converge in the major source of controversy in Mtwara since the early 2000s: the fact that 'the gas is going to Dar es Salaam but the industry is not yet here' (Devt. Pract. 3 2014). Negative accounts of gas emphasize that so far gas has by and large benefitted outsiders rather than locals in Mtwara. Mtwarans purportedly miss out on the benefits whilst foreigners and fellow Tanzanians get the lion's share. Business opportunities are grabbed up by non-locals, generally from northern Tanzania (Devt. Pract. 10 2014; Devt. Pract. 2 2014). A section of the international companies now present in Mtwara shy away from promoting local involvement (Devt. Pract. 6 2014). Poorly qualified, locals are condemned to work as cheap labour (Devt. Pract. 6 2014; TCCIA Information Officer 2014). Even minor opportunities to supply the gas industry fall into the hands of non- autochthons from 'Dar or Arusha' (Devt. Pract. 10 2014; Devt. Pract. 7 2014) – an alternative explanation blaming meagre expectations of profits, not discrimination (Devt.

Pract. 10 2014). The pipeline from Mtwara to Dar es Salaam, which was the *casus belli* for the 2013 protests (Devt. Pract. 3 2014), provides a material target for grievances. A frequent critique contends that gas is unavailable for Mtwarans, as it is pumped to Dar es Salaam (Devt. Pract. 8 2014). The poor results delivered so far by the Mtwara Development Corridor add to the feeling of grievance. Even though for some government officers the Mtwara Development Corridor is bringing about economic growth, particularly in infrastructures (Mtwara Regional Administrative Secretary 2014; TANROADS Mtwara Regional Manager 2014; TEMESA Mtwara Regional Manager 2014), for others the Mtwara Development Corridor is semi-comatose due to lack of political drive (Devt. Pract. 7 2014; Mtwara District Head of Planning 2014). Even amidst local authorities the prevailing notion is one of disappointing results (Mtwara Municipality Engineer 2014). Without infrastructural and economic connections, Mtwara risks becoming an 'enclave economy' (Devt. Pract. 10 2014). The benefits of gas, albeit supposedly abundant, are yet to be made tangible in Mtwara (Devt. Pract. 3 2014). The result is a rising dissatisfaction, of which the riots of May 2013 are but a punctual manifestation caused by lack of community involvement in the process, and insufficient returns for the locals (Devt. Pract. 6 2014). All in all, the motivations behind feelings of grievance are manifold. First and foremost, the government created unrealistic expectations. Citizens were not made aware of the fact that most benefits, e.g. jobs, would not be direct but only indirect (Devt. Pract. 10 2014; Devt. Pract. 2 2014; TCCIA Information Officer 2014). Second, communities were not told that the benefits of gas would only materialize after one or two decades (Mtwara District Head of Planning 2014; Mtwara Regional Administrative Secretary 2014). For some, the electoral campaign of ex-president Kikwete in 2010 goes a long way to explaining misconceptions in the public (Devt. Pract. 3 2014). Third, some infrastructural promises have so far been unmet. Notable amongst them is the pledge to build a LNG plant in Mtwara that followed the riots of 2013 (Devt. Pract. 2 2014). Lastly, the absence of alternative means of mediation between the political system and the citizens to absorb the latter's dissatisfaction results in popular outbreaks such as the events of 2013 (Devt. Pract. 10 2014). Undeniably, discontent expresses serious concerns about the slow pace of change in the region after the gas finds (Devt. Pract. 5 2014). All in all, the convergence of various grievances invites an extremely worrisome, even potentially disastrous, outlook (Devt. Pract. 10 2014). Some informants do not expect the developmental utopia to materialize in a near future. They state two reasons. First, the gap between Mtwara

town and other districts in the region will not be bridged easily, especially in the rural areas, even in 100 years. Second, Lindi will develop faster than Mtwara if the planned LNG plant is installed there (Dev. Pract. 2 2014).<sup>66</sup>

All in all, if at present challenges still remain, for most informants the prospects for the development of the South East remain very positive. Building on that, this section has attempted to assess the expansion in state reach along two axes: alterations in subjective representations of Mtwara as a region, and changes in subjective perceptions about the capacity of the state to deliver development in Mtwara. In both cases, the capacity of the state to whet the appetite of foreign investors and attract industrial ventures is regarded as a key link between gas exploitation and regional development. The analysis has shown that for key informants state capacity in Mtwara is equivalent to its capacity to attract investors. Indeed, the elevation of the capacity to attract investors to the condition of major indicator of state capacity is a function of years if not decades of state narratives extolling the wonders of a strategy of foreign investment-led industrial development embraced by the Tanzanian state since at least the mid-1990s. In Mtwara, the Tanzanian state has seemingly attained a remarkable capacity, undoubtedly assisted by the gas finds, to attract key stakeholders into a loose discursive coalition extolling the possibilities opened up by resource exploitation in the region. Infrastructure has played a major role in building up that coalition.

Overall, the above demonstrates a fundamental change in the attitudes towards the possibilities of social development and economic growth in the South East after the discovery of gas. Interestingly, the shift in expectations is present to a similar extent amongst local actors and centrally appointed government officials and TANESCO staff. Even so, the explanatory value of regional economic re-engineering as a force for policy change after 2012 remains partial, at best. The first reason is that schemes and, above all, discourses of regional economic reengineering were already present before 2012. The 'Mtwara will be like Dubai' speech of President Kikwete, uttered in 2010, attests to that. The second reason is that economic reengineering seems to be incompatible with the spatial patterns of electrification, as the analysis below shows. The territorial strategies of electrification after

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<sup>66</sup> In January 2016, Tanzanian PM Khassim Majaliwa announced that 19,000 acres of land had been made available in Lindi to build the LNG plant. See <http://www.theeastafrican.co.ke/business/19-000-acres-available-for-LNG-plant-in-Lindi/-/2560/3035948/-/14fetm6z/-/index.html> (accessed January 16, 2016).

2012 targeted urban households and, to a lesser extent, rural dwellers, which hardly resembles a push towards agricultural-led growth or industrialisation. As regards industrialisation, the electric supply to the few existent industries in Mtwara was already guaranteed by the 18-MW power plant. And future industrial demand (ie the Dangote cement factory and other smaller factories) aspired to satisfy its need directly from gas, not from electricity. Moreover, a strategy of economic reengineering would have accorded the highest priority to two projects: the 600-MW gas-fed power plant, and the connection of the southeast to the national grid (from Dar to Mtwara via Somanga Fungu). Instead, both projects were shelved, and a pipeline constructed to carry the gas extracted in the southeast to the national capital.

#### **4.5. Conclusion**

In contrast with the previous chapter about northern Ghana, this chapter set out to scrutinize one possible configuration of territorial strategies of electrification: strategies of electrification in a periphery endowed with abundant resources. Accordingly, the chapter has explored the political drivers behind the expansion of the grid and of access over southeastern Tanzania from the onset of the privately led Mtwara Energy Project in May 2004 to the completion of the gas pipeline from Mtwara to Dar es Salaam in October 2015. In comparison with northern Ghana, in this period administrative officials, political elites and utility staff already considered southeastern Tanzania a richly endowed region, once its gas started to flow commercially in the mid-2000s. This put the southeastern periphery along an altogether novel trajectory. But this trajectory was not at all exclusively led by the extraction of economic rents; political factors also mattered. Indeed, the political factors that came to the fore after the riots of May 2013 brought to the whole nation's attention the depth of disgruntlement caused by what locals perceived as an unfair distribution of the rents promised by gas. In 2013 political factors mutated against a backdrop in which geography, demography, income distribution and endowments remained constant. The policy benefits accorded to Mtwara and Lindi to further access denoted a change in the territorial strategy of electrification that can be sensibly attributed to the infrastructural grievances so vocally espoused by the locals. Other factors, notably the dwindling electoral margins of the incumbent CCM in the region, may not have been so decisive, according to the analysis in

this chapter. All in all, the comparison between the first and second stage of electrification in southeastern Tanzania demonstrates the influence of political factors in shaping the territorial strategy of electrification in the area. The comparison with northern Ghana intimates that the presence of exploitable endowments may steer territorial strategies of electrification in directions that differ significantly from trajectories, like northern Ghana, driven primarily by political concerns.

It is worth remembering, however, that the drive to increase access in southeastern Tanzania is set to last at least ten years, according to the government's plans. Paradoxically, the gas pipeline connecting Mtwara and Dar es Salaam deepened the electric isolation of the south-east from the rest of the country. As of 2015 the end of the national grid closer to Mtwara town, ie Dar es Salaam and Makambako, remained at a distance of approximately 500 and 700 kilometres, respectively. At the time of writing, the national grid is being extended from Makambako to Songea, and provisions are being made to deploy a line from Dar es Salaam (Kinyerezi) to Somanga Fungu, and from there onward to Mtwara (JICA, NEWJEC Inc., and The Kansai Electric Power Co. 2016). If the isolated regional grid reigned supreme until 2015, the pace and nature of an eventual incorporation to the national grid remains still undetermined.<sup>67</sup> Accordingly, the findings of this chapter must be seen as only a mid-term exploration of the territorial politics of access in the South East, and part of a sequence of developments which remains open-ended.

The findings of this chapter are relevant to various bodies of literature that touch upon core-periphery linkages in Tanzania. First, they speak to incipient interrogations about the political fractures instilled by the extraction of gas from southeastern Tanzania (Kinyondo and Villanger 2016; Pedersen and Bofin 2014; TCDD 2013). Second, the findings also engage with the recurrent, albeit intermittent, literature that has shown an interest in the evolution of centre-periphery relations between Dar es Salaam and the South East of Tanzania. From the infrastructural developments in Mtwara town, and the Southern Province Railway brought about by the Groundnut Scheme in the early 1950s (Burton 2014; C. P. J. Kelly 2011; Myddelton 2007; Rizzo 2006), to the Mkapa Bridge that broke the isolation of the South East

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<sup>67</sup> The connection between the south-eastern and the national grid is also the prerequisite for the construction in Mtwara of the oft-publicised 600-MW power plant promoted by Symbion – see <http://www.thecitizen.co.tz/News/Symbion-power-looking-for-investors-in-600-mw-Mtwara-project/-/1840340/3000264/-/108vs6yz/-/index.html> (accessed on January 22, 2016).

in 2004, the non-developed Mtwara Development Corridor (Kinshella 2014; Ministry of Industry and Trade. United Republic of Tanzania 2011; Mtegha et al. 2012) and, last but not least, *ujamaa* villagization in the south (Lal 2010, 2011; Spalding 1996), the progress of southeastern Tanzania has often been conceived in terms of (lack of) infrastructural development (Liebenow 1971; Seppälä and Koda 1998). Accordingly, this chapter has provided further empirical and analytical material to assess the role of infrastructure in shaping the territorial politics between the political centre of Tanzania and the South East.

Still, several conclusions for a theory of electric territorialities in the peripheries can already be drawn from the findings in this chapter. First, unlike in northern Ghana, gas endowments mattered. In the first period, they made an altogether novel model of provision enclosed territorially and with private participation, ie the Mtwara Energy Project, possible. In the second period, the unfair distribution of endowments was the primary source of locals' grievances. Second, after the riots political factors coalesced around the expression of infrastructural grievances against the capital. The extraction of gas or, rather, the perception that the benefits of gas were unfairly shared, inflamed long-held local feelings of injustice. As local grievances did not find their way through proper institutional channels, they took to the streets. This is telling not only regarding the closure of the Tanzanian political system to the demands of some of its regional peripheries, but also the political uses of electrification, a modern amenity associated with development, to address sub-national grievances. Third, and against conventional wisdom, political factors in southeastern Tanzania mattered at least as much as economic extraction. This was made all the more apparent after the riots of 2013. Trajectories of peripheral electrification in richly endowed regions cannot be isolated from political considerations, particularly when economic extraction eggs on local feelings of grievance.

A final consideration concerns the dynamics between the periphery and the centre. This chapter has shown how electrification was mobilized by the government to address the concerns voiced by the inhabitants of the periphery. The previous chapter about northern Ghana also made clear that, as the electrification of the communities progressed, their voice had to increasingly be taken into account. In northern Ghana the voices of the locals did not find an expression in riots (although demonstrations about the cost of electricity occurred recently), but in demands put forth in the run-up to or coinciding with electoral campaigns. In both cases, the programme of electrification stirred political reactions in the periphery.



Unfortunately, very little is known about the political mobilizations in the peripheries, or their main actors, the channels that they chose to pursue, the alternative repertoires of protest that were discarded, etc. This chapter, for instance, has prioritised a methodological bias which studies top-down dynamics and the strategic moves of the state, and pays less attention to the moves of peripheral actors. The study of electric protests and electric grievances in sub-national units is a promising field of study to understand African political systems but it is still, regrettably enough, virtually unexplored.

## 5 Territorial strategies of provision: adjudicating distributional settlements in regional peripheries

The fresh cycle of sectoral reform that started in the mid-1990s in many African countries disarticulated long-held notions in policy circles about how to distribute the costs of providing electricity to the final user. If the welfare-inspired Tanzanian Energy Policy of 1992 extolled the virtues of cross-subsidies to effect both equity and economic efficiency (MWEM 1992), the new policy positions in development circles that gained force in the 2000s bluntly argued in favour of efficiency. The draft Energy Policy of 2015 stated its policy objective in energy pricing in the following terms: ‘To ensure efficient and cost reflective energy pricing’ (MEM 2015, 28). In this policy statement, subsidies were presented as a temporary need during an unspecified transition period. In the new policy approach efficiency became not merely a means toward the financial sustainability of electric regimes, but virtually an end in and of itself. Characteristically, the new policy approach touted full-cost recovery, as aptly captured in a landmark report on the viability of African utilities published by the World Bank:

In the face of large utility deficits and low access rates, there is no compelling reason to subsidize those who can afford higher tariffs. Indeed, they could be asked to cross-subsidize low-income consumers more, as long as the latter’s total consumption is a small fraction of the total electricity sold (Kojima and Trimble 2016, ix); [the current] hope is that future economic growth will increase consumers’ ability to pay and eventually enable full cost recovery (Kojima and Trimble 2016, 7).

This consensus informed the policies sanctioned by African national regimes of electricity. With a mix of real and affected enthusiasm, Ghana and Tanzania incorporated the new consensus to their energy policies (Bhagavan 1999; Johnson 2010; Kapika and Eberhard 2012; M. A. Opam and Turkson 2000; Turkson 2000). Although often portrayed as merely technocratic exercises to determine the fair price of electricity with the assistance of

handsome mathematical models, sectoral reforms in Africa were more than that. They reformulated the answer to the central questions of political economy, as canonically formulated by Laswell: who gets what, when, how (Laswell 1936). This chapter sets out to explore the connections between the evolving distributional settlements inscribed in the national electricity regimes of Ghana and Tanzania, and the territorial strategies of provision in their peripheries implemented by central governments. In particular, this chapter seeks to interrogate how the distribution of the economic burden of producing, transmitting and distributing electricity over a certain periphery was adjudicated across categories of customers within the region (via intra-territorial cross-subsidies), between customers and the state (via cross-subsidies and public subsidies), or across customers in different regions (via inter-territorial cross-subsidies). To do so, it studies two phenomena that unfolded at the same time: the consolidation of the distributional settlements in the national electricity regimes of Ghana and Tanzania. The analysis characterizes the direction of the cross-subsidies between categories of customers, and between customers and the state. It also studies the evolution of the strategies of provision implemented in regional peripheries, ie northern Ghana and southeastern Tanzania. Setting one against the other, this chapter aims to decipher to what degree provision in the peripheries of Ghana and Tanzania aligned with the course of the policies in the national electricity regime, and to what degree it diverged. If existent, this divergence constitutes an eminent indicator of territorial strategies of provision of electricity that are specific to the peripheral regions.

The insights in this chapter help to illuminate one aspect of the unfolding of electric territorialities: the interplay between core-periphery linkages and national electricity regimes. As argued in the theoretical chapters, it is crucial to consider both aspects jointly. Focusing on the routine provision of electricity, the insights in this chapter complement the findings about the delivery of access from the two previous chapters. As far as the provision of electricity is concerned, they provide a tentative characterization of two trajectories of provision differentiated by the availability of a local, cheap resource to generate electricity: gas in southeastern Tanzania.

Unlike in the previous two chapters that undertook a comparative and longitudinal analysis of northern Ghana and southeastern Tanzania, this chapter compares the cases. In this way it can isolate the influence of the most significant difference between both cases, namely the absence or presence of resource endowments (ie gas in southeastern Tanzania). This

research design helps to unveil the paramount influence of resource endowments in making the original territorial strategy of provision in southeastern Tanzania possible. In theory, this strategy was founded on the idea of containing cross-subsidies within the region, in the pre-figuration of policy goals adopted later in the Electricity Roadmap (MEM 2014). The retroversion of Mtwara and Lindi to TANESCO in 2012 only partially altered the strategy. By contrast, the absence of endowments in northern Ghana put the provision of electricity into stark contrast with the direction that nationwide policies were taking, particularly after the various power crises of the 2000s.

This first section characterizes the deep-entrenched distributional settlements between categories of customers, and between customers and the state, that are inscribed in national electricity regimes. The second section studies the evolution territorial strategies of electricity in northern Ghana and southern Tanzania. This section takes as its guiding thread the re-articulation of distributional settlements over time. Particular attention is paid to the direction of cross-subsidies between categories of users, as well as from the state. The section also offers a graphic representation of the nature of cross-subsidies that helps to compare the trajectories of northern Ghana and southeastern Tanzania. The third section analyses the attendant organizational setups that undergirded the implementation of the territorial strategies of electrification described earlier. The conclusion summarizes the chapter's main findings, discusses how such findings speak to the theoretical elaboration on the territorial strategies of electrification, and examines the insights that this chapter provides on the interplay between national regimes of electricity and core-periphery linkages.

### **5.1. Distributional settlements in the national electricity regimes of Ghana and Tanzania**

The supply of electricity over northern Ghana and southeastern Tanzania did not commence, or proceed, in a policy vacuum. Supply in the peripheries was to a considerable extent shaped by a dense web of actors, coalitions, discourses, policies, rules, shared understandings, technical configurations, etc in the power sector. This section describes the dominant features of Ghana's and Tanzania's power sectors and draws on the characterization of national electricity regimes espoused in the theoretical chapter. There, national electricity

regimes were said to be characterized by the material setups, the actors and the institutions, ie the rules (van der Vleuten and Raven 2006). The previous chapters on the territorial politics of access have already dealt in detail with the evolution of the material setup of the grids in Ghana and Tanzania so this section shies away from repeating itself. This section puts particular emphasis on the institutional rules of the game that adjudicate distributional issues between categories of users, and between users and the state (often via utilities). The analysis here also considers the ascendancy of the most important actors, especially those who exert a large influence over peripheral electrification. Obviously, it would be impossible to offer in a few pages a fair depiction of the features of the national electricity regimes of Ghana and Tanzania so this section pays special attention to one element: how distributional issues between categories of customers, and between customers and the state, were adjudicated over time, over aspects such as the extent of subsidies, or the distribution of authority between the actors. The analysis here will serve in future sections, amongst other things, to identify the dissimilarities between the prevailing distributional settlement in the national regime, and the settlement that emerged over time in the peripheries. The dissimilarities so identified may reasonably be taken to point to components of the territorial strategies of provision over the peripheries.

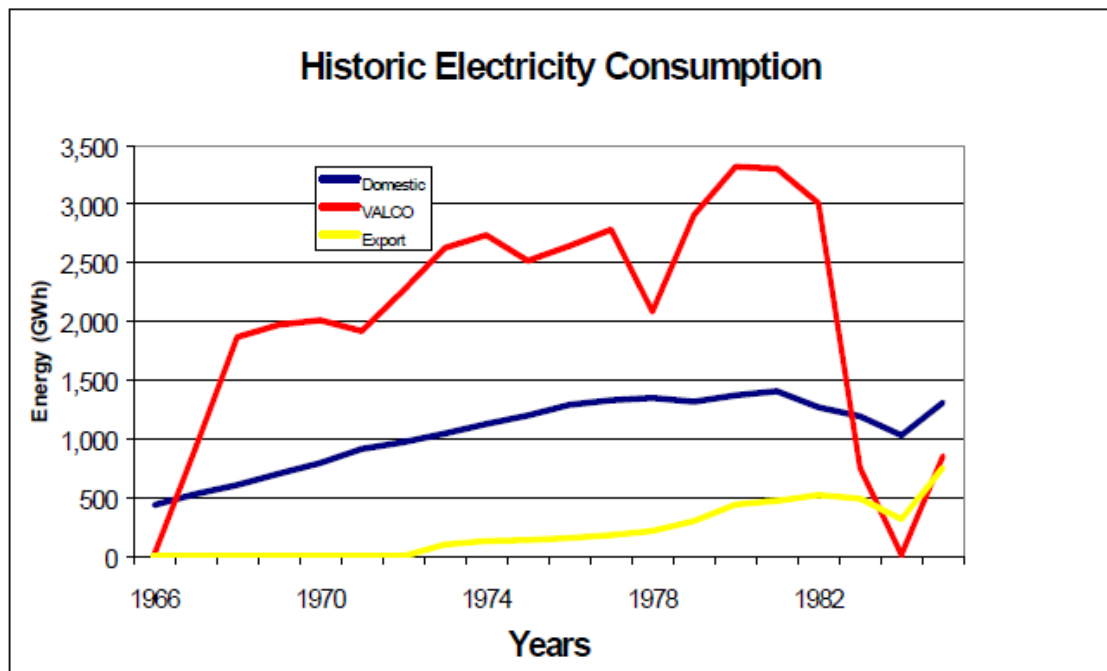
In Ghana, the foundational feat of the national electricity regime was the Volta River Project. The project not only yielded the Akosombo Dam; it also contributed to elevating electricity to the category of modernity icon in Ghana (Ferguson 1999; Hoag 2006; D. M. Hughes 2006; A. Isaacman and Sneddon 2000; Kaika 2006; Miescher 2014; Miescher and Tsikata 2010; Showers 2011; Tsikata 2006), as would be the case in other African countries later (Cooper 2002, 2005; Ferguson 1999). The popular one cedi note in circulation, which depicts an image of Akosombo, continues to be an apt reminder of the persistence of ideals of modernity and statehood articulated around the dam. But the symbolic enthronement of electricity also paved the way for three institutional breakthroughs: first, the prioritisation of the VRA, on the supply side, and of the Volta Aluminium Company of Ghana (VALCO), on the demand side, over other actors in the power sector; second, the creation of a regime of hydropower opulence, premised on Akosombo, intended to serve industrial interests first and foremost; and third, the growing shadow of the World Bank over Ghana's power sector, whose ideological production and projects reinforced all of the former. The first institutional breakthrough saw the establishment of VRA in 1961. Albeit strictly conceived to operate

generation and transmission, VRA exceeded that original mandate. VRA oversaw the construction of the facilities for the Volta River Project (Ayensu 2013; Faber 1990; Hart 1980; Hilling 1965; Sawyerr 1990), but its stature soon acquired gigantic dimensions in various areas. The self-appointment of Nkrumah as Chairman of VRA was a telling indicator of the relevance that the Ghanaian leader attached to the project in the transformation of Ghana's economy and politics. Beside VRA, ECG paled in comparison. ECG was established in 1967 as international donors insisted on the figure of a public corporation to participate in a programme of assistance to the utility (Kuruk 1989) and succeeded the Electricity Division that had been created within the Ministry only eight years earlier (IBRD and IDA 1968). ECG received a mandate to distribute electricity, by and large acquired from VRA, in what was by then the only sector of Ghana served by the national grid, ie the southern sector. The division of labour allocated generation and transmission to VRA and distribution to ECG. The division was not completely fair, though, as VRA retained the direct, high voltage supply to the energy-intensive, lucrative mines. In addition, in this settlement VRA acquired a considerable degree of autonomy from the Ministry of Fuel and Petroleum. One chief reason was the financial autonomy of VRA as well as, for some analysts, the support of the World Bank (F. N. Botchway 2000; Brew-Hammond 1997). The necessary complement on the demand side to VRA was the aluminium smelter in Tema operated by VALCO. Since the very beginning of its operations, VALCO consumed a disproportionate amount of the electricity generated by VRA (see figure 33). According to its designers' calculations, Akosombo was expected to cover the Tema smelter's demand for more than a decade (IBRD 1961; IBRA and IDA 1969). The remaining demand was tiny compared to VALCO's, at least until the industrial take-off expected by Nkrumah manifested itself. The Akosombo Dam largely exceeded the residential and commercial demand of 69 MW so with it the country embarked upon a path of hydropower abundance. The two major retrofits of Akosombo in the mid-1970s and late 1990s, which increased the installed capacity to 912 MW, prolonged this period of electric over-abundance even more. This circumstance was wisely exploited to export power to Cote d'Ivoire and Togo, which in turn enhanced VRA's financial status by adding more foreign currency to the payments in dollars already made by VALCO. Within Ghana, by 1967 Akosombo had made most customers shift from electricity generated from diesel to hydropower (Showers 2011). Although over time it became clear that the aluminium smelter was not living up to its promise of spurring an economic take-off (Agbemabiese and

Byrne 2005; Ayensu 2013; Coquery-Vidrovitch 2004; Dickinson 1982), the Volta River Project had revolutionized the national electricity regime in Ghana barely a few years after its entry into operation. In particular, the project set the power sector on a course that upheld a primacy of industrial interests served by a hydropower-opulent VRA. This triangle remained largely unchallenged until the mid-1990s. If by 1947 approximately 45% of demand in the country was domestic (IBRD 1961), upon inauguration of the Tema smelter and subsequent growth in industrial activity, demand would become heavily dominated by the industry. This instituted a vested interest in how tariffs were to be fixed. Lastly, Akosombo and the transmission network afforded the World Bank what over the following decades would become a decisive stance of the World Bank in Ghana's power sector. The World Bank contributed to broker the negotiations leading to the agreement between the government of Ghana and Kaiser Aluminium regarding the Tema smelter and Akosombo. Starting immediately after the Volta River Project was completed, eight projects sponsored and funded by the World Bank came quickly one after the other until 1990. The World Bank's activity in Ghana was so intense that at some stages various projects were underway at the same time.<sup>68</sup> As the World Bank itself said in one report in 1997: 'IDA considered power development in Ghana a high priority; at time of project appraisal in 1988, it had financed virtually all power development in Ghana and had lent more to the power sector than to any other sector in the country' (World Bank 1997, iii). This gave the World Bank an influential position in Ghana's national electricity regime. The World Bank's leverage was crucial in electrification in the north of Ghana. According to a World Bank employee involved in negotiations with the government of Ghana in the late 1980s: 'We pressed very hard for [the creation of NED]. It was pretty much a precondition for the loans that made the grid arrive in the north' (cited in Johnson 2010, 144).

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<sup>68</sup> The list includes: Distribution, Expansion and Development of ECG, to an amount of US\$ 10 million (IBRD and IDA 1968); Volta Expansion Project, US\$ 6 million (IBRD and IDA 1969); Second Power Distribution Project, US\$ 7.1 million (IBRD 1970); Third Power Project, US\$ 18 million (World Bank 1977a); Kpong Hydroelectric Project (World Bank 1977b); Power System Rehabilitation Project, US\$ 28 million (World Bank 1985); the Northern Grid Extension Project, US\$ 6.3 million (World Bank 1987); Fifth Power Project, US\$ 40 million (World Bank 1989); and Sixth Power Project, US\$ 20 million (World Bank 1990). Secondary contributors to one or more of these projects included Austria, Canada, the Federal Republic of Germany, France, Italy, the European Investment Bank and the United Kingdom.

**Figure 33: Electric consumption (GWh) in Ghana per category of customer, 1967-1985.**

**Source: ISSER (2005, 21).**

The economic crises of the seventies did little to challenge the twin hegemony of VRA and VALCO, united by Akosombo. In this period, electric demand continued to grow at a respectable 5.5%. In 1982, VRA supplied 62% of its production to VALCO, and only 11 to ECG. The latter scarcely produced a small fraction of total generation from 41 thermal local plants that contributed a meagre 5% of the energy required to serve its own customers; the rest was acquired from VRA. To make matters worse, until 1981 ECG bought electricity from VRA and sold it to retail customers at a tariff of 1.34 pence per kWh below the acquisition price, inevitably incurring in losses. The only serious threat to the ascendancy of VRA was the severe drought of the early to mid-eighties, that brought into sharp focus the risks of depending almost entirely on hydropower for generation (Kuruk 1989). VRA, however, continued to benefit from revenue in foreign currency in a context of severe economic hardship in Ghana. In the seventies, for instance, foreign revenue rose to represent over 70% of total income. As mentioned above, not only VALCO contributed with foreign currency; the utilities of Togo, Benin and Cote d'Ivoire also contributed a smaller share, once did after exports to Togo and



Benin started in 1972, and in 1983 for Cote d'Ivoire. Throughout the 1970s and 1980s VRA also continued to enjoy substantial institutional autonomy from the then Ministry of Fuel and Power, and direct access to the Presidency. Its reputation among West African utilities was enviable (Brew-Hammond 1997; Johnson 2010).

In Tanzania, at the same time VRA was created, TANESCO was nationalised in 1967 in the aftermath of the Arusha Declaration, three years after it had been established.<sup>69</sup> The state of the independent Tanzania declared as its mission to provide electricity, a vital input, for industry, the peasantry and to provide a decent urban life, against a background of import-substitution-led industrialisation (Coulson 1982). The actual achievements were more modest, though. Part of the blame for this was the British legacy (R. H. Ghanadan 2008; Hoag and Öhman 2008; Scott 1988; van der Straeten 2014, 2017). The installed capacities in generation inherited in 1963, as well as the geographical reach of distribution, were minimal. Moreover, they had been largely conceived for the advancement of urban commercial sectors and agro-processing and basic manufacturing industries. It is unsurprising then that the modest manufacturing boom of the late 1960s and early 1970s brought electric demand to the following distribution: 50% industrial, 40% commercial, and a mere 10% from households. Indeed, household consumption only climbed to 20% after the mid-80s, after the World Bank successfully lobbied for the introduction of cross-subsidies from urban to rural areas, and from industrial to household customers. The industrial and generalised collapse that followed structural adjustment in the mid-1980s, nevertheless, put an end to cross-subsidies, in turn shedding household consumption. International donors, having the upper hand, furthered an agenda based on restructuring and privatization. To further compound the problem, the crisis of the late 90s and early 90s deteriorated TANESCO's balance sheet. TANESCO, which in the not so distant 1982-83 had been praised by the World Bank as one of the best utilities in the world, found itself in severe financial straits, with a chronic problem of retail tariffs well below the cost of generation (Former TANESCO Deputy Managing Director Finance 2014).

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<sup>69</sup> Full ownership, ie complete acquisition of the shares, took eleven more years, according to TANESCO's website:  
[http://www.tanESCO.co.tz/index.php?option=com\\_content&view=article&id=38&Itemid=126](http://www.tanESCO.co.tz/index.php?option=com_content&view=article&id=38&Itemid=126)  
(accessed November 19, 2015). Amann indicates a slightly different period (1969).

From the mid-90s onward, sectoral reform became a mantra for donors, ministers, policymakers and TANESCO senior managers.<sup>70</sup> That was not the case yet when the Energy Policy was formulated in 1992. The policy stipulated that ‘energy must be delivered to the point of end-use and be made available at a cost that is affordable to the consumer,’ that ‘energy pricing will not simply be left to the market forces,’ and that ‘while it is essential to price electricity at an economic value, cross-subsidisation, as a deliberate tool to effect social equity, and growth objectives is normal in utility pricing’ (MWEM 1992, 19, 20). By the end of the 1990s, such positions had started to recede. In 1997, TANESCO had been “specified” for privatisation,<sup>71</sup> an indication of the diminished stature of TANESCO vis-à-vis donors and other actors in Tanzania’s national electricity regime. The principle of full-cost recovery had made considerable headway in policy circles, particularly amongst donors. In the mid-2000s a new Electricity Act was underway (Johnson 2010). Since the late 1990s, donors had lobbied in favour of Independent Power Producers (IPPs) to fix chronic undercapacity in generation, but IPPs necessarily came associated with tariffs that reflected the whole cost of generation (Eberhard and Gratwick 2011; Girod and Percebois 1998; K. N. Gratwick 2007). At the same time the government was painfully aware of the political costs of passing on the whole cost of electricity to customers. Successive reforms made four major changes: a) IPPs; b) an attempt to outsource the management of TANESCO to a private South African company, NETGroup Solutions, in 2004; c) new institutional actors, namely the two agencies mandated to regulate and undertake rural electrification, ie EWURA and REA, respectively; and d) renewed efforts to minimize commercial losses and protect revenue by means of groundbreaking techniques, chief amongst them pre-payment metering. Albeit the outcome of reforms remaining mixed at best, these four novelties reconfigured Tanzania’s national electricity regime. In the first place, the fuel plants constructed by Independent Power Producers in Dar es Salaam delivered much needed generating capacity, if often at an overrated price per kilowatt-hour (D. Peng and Poudineh 2016). There were three plants: Independent Power Tanzania Ltd. in 2000, Symbion in 2011 Ubungu, and Songas in 2004, all of them in Dar es Salaam (Cooksey 2002; Kapika and Eberhard 2012). This extra capacity did not spare Tanzanians from recurrent episodes of load shedding like in 2000 (World Bank

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<sup>70</sup> The main source for this paragraph is Kapika and Eberhard (2012) but some information was already gathered from two former senior officers (Former TANESCO Deputy Managing Director Finance 2014; Former Tanzania’s Ministry of Energy Permanent Secretary 2014).

<sup>71</sup> It was only de-specified in 2005 (Johnson 2010).

2001b), from February to the third quarter of 2006, for up to 18 hours (K. Gratwick, Ghanadan, and Eberhard 2006), and again in 2011 (Kapika and Eberhard 2012). The plants also supposedly helped to reduce the emergency bill from about US\$ 200 million to 29 million per year, given that a recurrent recourse of TANESCO's in the event of power shortages was to hire emergency plants fed by expensive liquid fuels. The contracts with IPPs were in some cases marred by collusion between business interests and top officials in the MEM, which provoked several scandals. Notable amongst them was the Richmond saga, which triggered the resignation of then Prime Minister Edward Lowassa in 2008 (Cooksey 2011; H. S. Gray 2015; D. Hall 2007; van Niekerk, Sandra Msechu 2012). Another less cited example was the Songas project in the 1990s and 2000s, originally a public project but subsequently purportedly transferred to private hands 'on a silver plate' (Former TANESCO Deputy Managing Director Finance 2014).<sup>72</sup> The difficulties marring TANESCO's reputation led the Ministry to embark upon an experiment that saw the management of TANESCO outsourced in 2002. The scheme ultimately failed, as the South African company that took over the management contract supposedly failed to honour its commitments to invest funds in TANESCO. Most importantly, the contract did not enhance TANESCO's technical performance, as measured by losses and reliability of supply (Kapika and Eberhard 2012). On the positive side, the South African contractor managed to collect outstanding debts from the government, and quickly double revenue (R. Ghanadan and Eberhard 2007; K. Gratwick, Ghanadan, and Eberhard 2006). The contract was not renewed in December 2006. TANESCO was left in a similar situation as at the onset of the management contract. Another way to address TANESCO's financial woes was the deployment of prepayment meters to help TANESCO to monetize all the power distributed. Under this model, power was paid by customers prior to consumption, not afterwards as in conventional post-paid models. They were experimentally introduced in the late 1990s, but mainstreamed across urban areas of Tanzania in the early 2000s. Albeit in introducing pre-payment metering Tanzania simply rode

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<sup>72</sup> Things only became worse after 2010, when the privately-owned Songas became solely interested in immediate demand and not in large investments. Songas' proposals were not beneficial to the country; for instance, Songas advocated for a modest pipeline from its gas fields to Dar es Salaam. TANESCO counter-argued noting that the project lacked economies of scale. Similarly, TANESCO was against the plans of senior members of the MEM to lay a gas pipeline from Mtwara; instead, TANESCO preferred to generate power in Mtwara and extend a high voltage line to Dar es Salaam, thus closing the national grid loop. A power plant in Mtwara, if connected to the national grid, would also serve the additional purpose of facilitating exports of electricity to neighbouring countries (Former TANESCO Deputy Managing Director Finance 2014).

a continent-wide wave, it soon became one of its most passionate adherents (Baptista 2015; R. Ghanadan 2004, 2008; McDonald 2009a; von Schnitzler 2008). All in all, from 2003 through 2009, TANESCO only recorded profits in 2005. The massive losses of 2003, 2004 and 2006, in excess of a hundred million each year, resulted from a massive gap between electricity sales and the cost of electricity generated or acquired or both for distribution (Kapika and Eberhard 2012).

The direction of the cross-subsidies embedded in the tariffs of Ghana and Tanzania, as established by the respective distributional settlements, is not easy to discern. Keener and Banerjee (2005) analysed the tariff structure in Ghana between 1998 and 2003. They found that 'the middle tariff band (51-300 kWh) was paying below actual average cost and therefore was being subsidized as well as the lifeline band' (Ibid, 4).<sup>73</sup> Also, they revealed that 'until 2003 lifeline customers were, on average, paying slightly more or the same per unit as the next two tariff bands (51-300 kWh)' (Ibid, 10), in a clear inverted cross-subsidy from lifeline to middle band customers. This distributional settlement was hardly new. Before 1992, residential and industrial customers paid 20% and 26% of the long run marginal cost of electricity, or virtually the same amount, in a tariff extremely advantageous for industries. At the same time, Keener and Banerjee also found that the lifeline subsidy benefitted a significant proportion of households not below the upper poverty line. The effect of the tariff increases of the early 2000s was felt in the accumulation of arrears amongst other things. This was possible in a context in which, first, consumer attitudes towards arrears were very lax and, second, consumers rightly assumed that as long as their arrears did not exceed a certain threshold, the utility would not disconnect them. A significant number of customers defaulted on electricity bills every month meaning residential customers' arrears increased by 34% between 2002 and 2003. This coping mechanism entailed a *de facto*, informal subsidy to those in arrears, as long as they were not disconnected. Another informal cross-subsidy that the Keener and Banerjee study revealed goes from customers who pay their bills at above cost of supply to lifeline customers, for whom the government was not satisfying its subsidy payment to utilities in time.

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<sup>73</sup> The lifeline tariff was a flat rate for users who consumed less than 50 kWh per month. According to Keener and Banerjee, 'it was originally created to minimize the cost to the utility of billing small accounts' (2005, 4).

In Tanzania, Hoogeveen (2007) concluded that all categories of customers were subsidized, as TANESCO charged an average of US\$ 0.07 per kWh for a cost of US\$ 0.1 per kWh. The subsidies were shared differently by the different classes. Of the 50% consumed by households, the middle and upper classes absorb 85%. The poorest 20% of households accounted for only 6% of total consumption. Therefore, a disproportionate part of the subsidy ended up benefitting upper and middle class residents, as well as businesses. Indeed, the richest quintile received 54% of the subsidy implicit in the tariff. These findings are coherent with the analysis of Peng and Poudineh (2016) one decade later. According to their data, 'the lifeline rate present can be seen as a cross-subsidy from T1 customers to D1 <50 kWh customers. The size of this cross-subsidy is small relative to the size of the overall sector' (D. Peng and Poudineh 2016, 69).<sup>74</sup>

The account above makes it sufficiently clear that the policy environments in Ghana and Tanzania were very dissimilar at the onset of the peripheral electrification schemes. Ghana had started to implement timid reforms, but the demonization of cross-subsidies or full-cost recovery were not yet part of the consensus across the actors of the national electricity regime. The Tanzanian government, by contrast, had already in 2004 given its consent, at least on paper, to new methodologies of tariff-setting more attuned to market principles. This inevitably made the Tanzanian government regard initiatives such as the Mtwara Energy Project more favourably.

## **5.2. Territorial strategies of provision in northern Ghana and southeastern Tanzania**

In setting about to provide electricity to households, commerce and industries in northern Ghana and southeastern Tanzania, policymakers had to devise distinct strategies of electrification that suited the specificities of peripheral regions. In the case of northern Ghana, they were required to contend with an extended fraction of low-income customers, considerable rural populations, and little or no industry. Potential distributional settlements, e.g. cross-subsidies from industry to households, were hardly a possibility in northern Ghana,

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<sup>74</sup> D1 customers consuming less than 50 kWh per month fall inside the lifeline category.

where industry was barely existent. In the words of the most senior staff in the Marketing Department of NEDCo at its headquarters in Tamale:

The tariff system is supposed to be: the rich subsidise the poor. But in our case we are operating at a very deprived area. Even if you come to the urban areas the customers who are to subsidise the poor are very few: very, very few. And so at the end, we have no subsidy (NEDCo Principal Marketing Officer 2013).

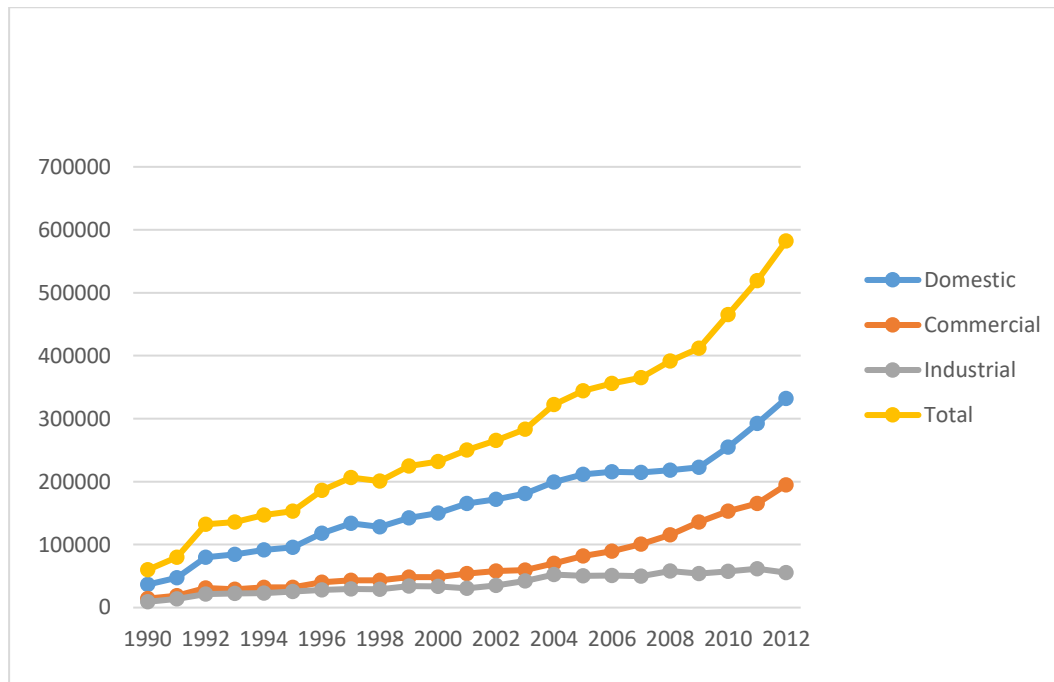
In southeastern Tanzania, the architects of electric policies potentially benefitted from a wider array of options made possible by the presence of gas. At the same time, they had to accommodate the fact that the South East remained an electric island from the rest of the country. In devising institutional strategies to provide electricity, policymakers in fact reached singular distributional settlements between categories of customers and, crucially, between regional units. This section explores the distributional settlements reached in northern Ghana and southeastern Tanzania during the same two periods of the programmes of electrification specified in the previous chapters.

#### **5.2.1. Subsidizing provision regardless of cost: Northern Ghana, 1989-2000**

The territorial strategy of provision that prevailed in northern Ghana rested on the fact that the number of customers connected by 2000 was still negligible compared to those in the South operated by ECG. In effect, in that year NED supplied a customer base of 115,273, compared to the 817,325 customers served by ECG (EC 2013). NED's losses supplying such a limited number of customers could be considered irrelevant compared to the developmental benefits of the electrification of the North. Rulers in Accra and policymakers benefitted from a political space to subsidize the provision of electricity in northern Ghana regardless of its cost. Considerations of cost-recovery were minimal, and the general understanding in policy circles was that the North was entitled to benefit from cross-subsidies from the public coffers.

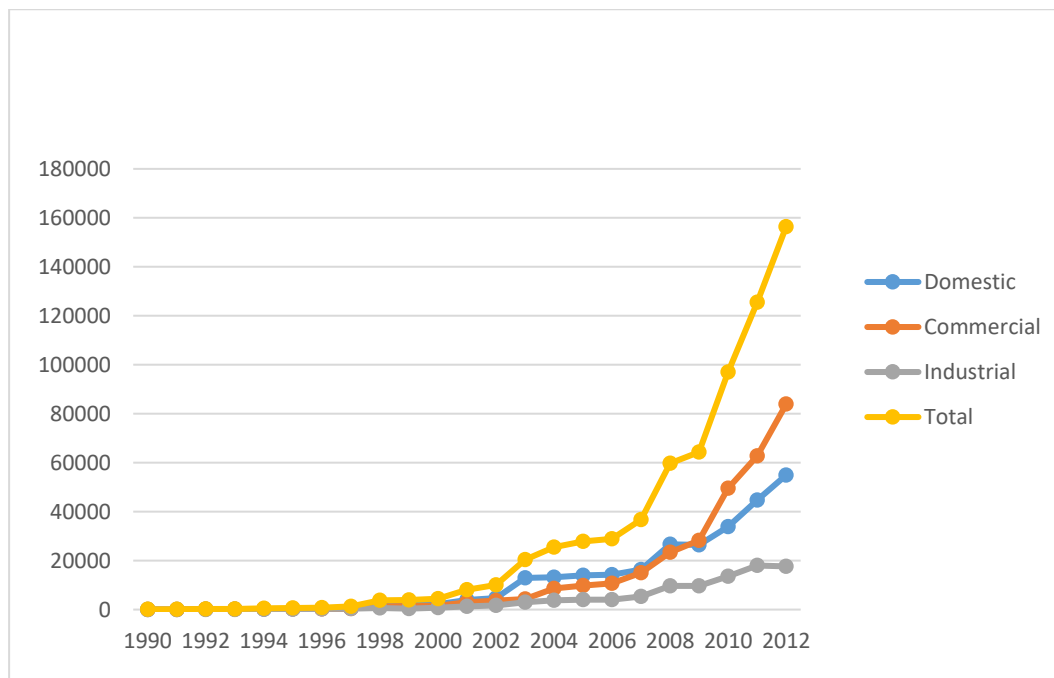
This does not imply that the growth in the number of customers between 1990 and 2000 was modest; just the opposite. In the space of a decade, the number of customers multiplied by a factor of over five. The majority of new customers were residential, as commercial and, especially, industrial users remained relatively small in number. The general pattern, captured in figures 34 and 35, held for the number of electricity units (kWh) billed, as well as for the revenue generated by each category of customer.

**Figure 34: Billed energy (kWh) per category of customer, NED.**



Source: Unpublished data from NEDCo.

**Figure 35: Billed revenue (Ghana cedis, GHS) per category of customer, NED.**



Source: Unpublished data from NEDCo.

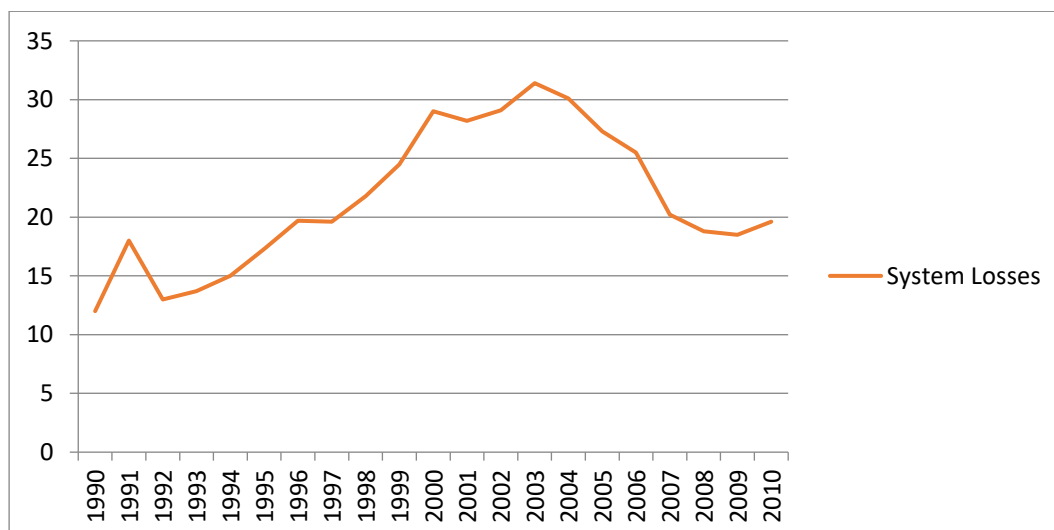
Still, revenue collection was significant by 2000, despite the impressive growth in numbers. With residential customers constituting the lion's share of the customer base, NED's financial health was largely dependent on revenue collection from households and businesses. Taken together, households and business accounted for 86% of NED's overall revenue in 2000 (PURC 2002). However, this was not necessarily a concern for rulers in Accra, motivated as they were, as the previous chapter showed, by electoral calculations as well as by a developmental drive. Nor were international donors anxious about the losses NED incurred. As the World Bank recognized: 'The net profits of VRA for 1991 and 1992 were US\$46 million and US\$43 million equivalent, respectively. This represents a rate a return on revalued average net fixed assets in operation of 8.3 and 6.7 in each of these years. As long as this healthy condition persists, the NED project can be sustained. The profitability of the project is unlikely to improve substantially only with load growth' (1993a, 7). Crucially, NED losses were not seen as worrisome as long as they were offset by the profits of VRA. Accordingly, the World Bank was sympathetic to the challenges of massive rural electrification in the North: '...the financial results of the NED operation have closed with a loss in each of the past three years of operation. In part this is a normal pattern for a rural electrification operation, which begins with few customers and with large sunk costs, but in large part it is a reflection of having to supply power at rates which do not cover the cost of supply' (World Bank 1993a, 9). World Bank analysts were recognizing that VRA's profits, that is, in the generation segment of the electricity sector, were subsidizing the losses in the distribution segment in northern Ghana.

NED's accounts were also marred by the rapid depreciation of its assets, amounting to 113% and 108% of electricity sales in 2001 and 2002, respectively (PURC 2002, 2003). But the most troubling indicator concerned the extent of system losses in distribution, that is, the addition of technical losses caused by long lines and faulty equipment, and of commercial losses provoked by unmetered customers and poor collection capacities. As reflected in figure 36, after the mid-1990s, system losses remained extremely high. Technical losses due to long lines and aging materials fluctuated slightly around 10% (World Bank 2013a, 29). The situation was even worse by the late 1990s. Distribution losses reached 30%, well above the 25% that power utilities in sub-Saharan Africa averaged (Eberhard et al. 2008, 17). Whether these negative trends in revenue collection were caused by an emphasis on expanding the



network, which left revenue protection techniques unattended, or by a lack of proper means of collection, is difficult to establish. The pattern is striking considering that a majority of customers connected in the north in 1989-2000 pertained to urban areas. Arguments often put forth by NEDCo staff about the scarcity of material means, ie vehicles, to reach customers (NEDCo Planning Engineer 2013; NEDCo Tamale Area Commercial Officer 2013; NEDCo Upper East Acting Area Commercial Officer 2013), seem to hold little water in this period. It is more likely that NED staff, politicians and international donors paid altogether little attention to the losses, both financial and technical, in the north at a time (late 1990s) in which Ghana was undergoing a major crisis caused by the Akosombo production shortage.

**Figure 36: Distribution losses of NED (%), 1990-2010.**



**Source: VRA (2011, 37).**

The late 1990s brought about the second major power crisis in the recent history of Ghana.<sup>75</sup> This projected the power sector into severe distress nationally. In 1995 the direction of electricity flowing to Cote d'Ivoire has already been reversed for the first time due to massive shortages in Ghana after Akosombo, marred by low levels in the lake caused by drought,

<sup>75</sup> The list of major episodes of load shedding in Ghana includes 1983-1984, 1997-1998, 2003, 2006-2007 and 2011-2016 (Kemausuor and Ackom 2017).

proved insufficient to meet the country's growing demand. But the crisis of 1997-98 hit Ghana itself, as the country underwent the second major episode of load shedding in recent history. The image of Akosombo as the source of inexhaustible power took a severe blow, as it had in the first power crisis of 1983-84. Faced with the dire situation of generation in the country, and under renewed pressure from donors, in 1996 the Rawlings government designed a new policy approach, encapsulated in Vision 2020 (GoG 1996). A committee was set up to suggest reforms in the power sector. This committee carried out its mandate under intense pressure from donors, especially the World Bank and the IMF (Edjekumhene, Amadu, and Brew-Hammond 2001; Edjekumhene and Brew-Hammond 2003; Girod and Percebois 1998; Kapika and Eberhard 2012). The 1997-98 crisis occurred at the same time as a broader continental policy drift towards 'sound economic policies' and liberalisation that swept all across sub-Saharan Africa (Alleyne 2013; Kapika and Eberhard 2012; Victor and Heller 2007). Internal and external pressures were met by the government with mixed responses, alternating between reform zeal and resistance (Malgas 2008). The first wave of liberalisation in 1997 led to the creation of two regulatory bodies, the Energy Commission and the Public Utilities Regulatory Commission; generation opened up, at least on paper, to Independent Power Producers and the distribution segment saw an increase in tariffs to bring them closer to the cost of production and distribution (M. Opam 1995; M. A. Opam and Turkson 2000). As the tariffs were the same across all Ghana, the rise in the tariffs also affected the North. Overall, however, the tenor of the distributional settlement in the northern regions remained unaltered by the first wave of reforms of the late 1990s. The extension of the grid to the district capitals and the incipient rural electrification continued unhindered, despite the growing losses incurred by NED. The losses induced by the NES remained within VRA, relatively hidden from the attention of the public as well as from multilateral institutions. Users of electricity in the North enjoyed a cross-subsidy from the generation segment. Most importantly, the prevailing distributional settlement for northern Ghana ran contrary to the prevailing adjudication of the costs of electricity supply in the whole of the country. The extant adjudication of costs greatly benefitted VALCO, which paid electricity at a comparatively lower cost than residential and commercial customers, even after tariffs had been renegotiated (Amin 2001; ISSER 2005; Keener and Banerjee 2005). In the whole country the cross-subsidy presumably went from taxpayers and medium-income users of electricity

to VALCO and rural customers. In northern Ghana, by contrast, the cross-subsidy flowed toward rural customers only.

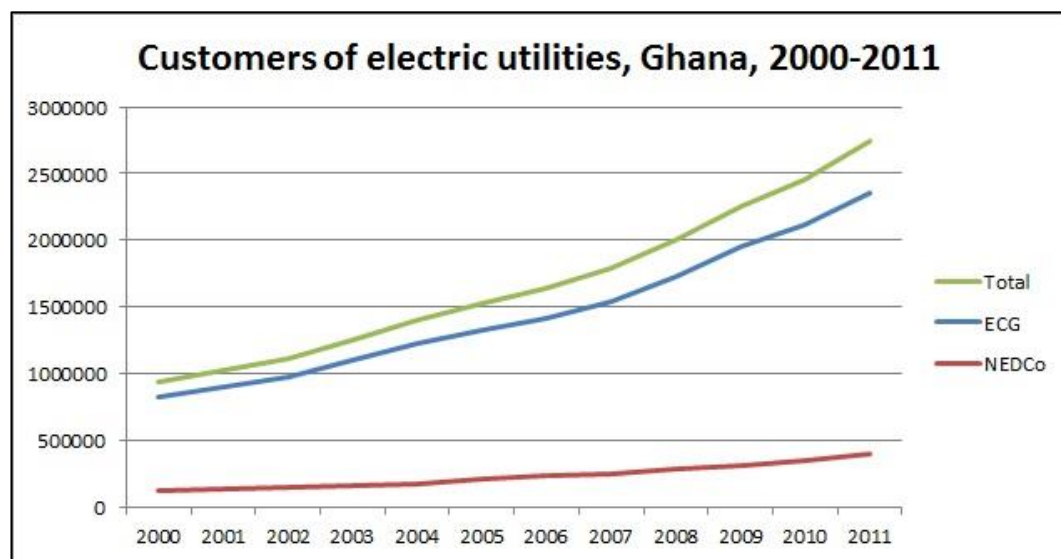
### **5.2.2. Containing losses: Northern Ghana, 2000-2012**

Unlike the previous period, between 2000 and 2012 the territorial strategy of provision of electricity to northern Ghana began to incorporate a concern about how the provision of electricity could be made economically sustainable over the long term. Even though policymakers and donors still regarded NED as a Cinderella in Ghana's national electricity regime, power shortages, the growing weight of residential demand in total supply of electricity, and an ideological shift towards full-cost recovery in electricity tariffs indirectly brought to attention the economic sustainability of the provision of electricity in the North. Tariff increases conceived in Accra to improve the ailing condition of ECG "travelled down" to northern Ghana, diminishing the amount of the subsidy that middle band users in the North received from the state.

As a result of the electrification spree in the North, NED's load doubled over the 2000s (NEDCo Planning Engineer 2013).<sup>76</sup> The number of customers grew so much that the northern sector outpaced the increase in connections in the area ECG operated. NED's share of customers grew to an all-time record of 16.7% in 2011 (EC 2013).

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<sup>76</sup> The MoE claims most of the credit (Ministry of Energy Director of Power 2013).

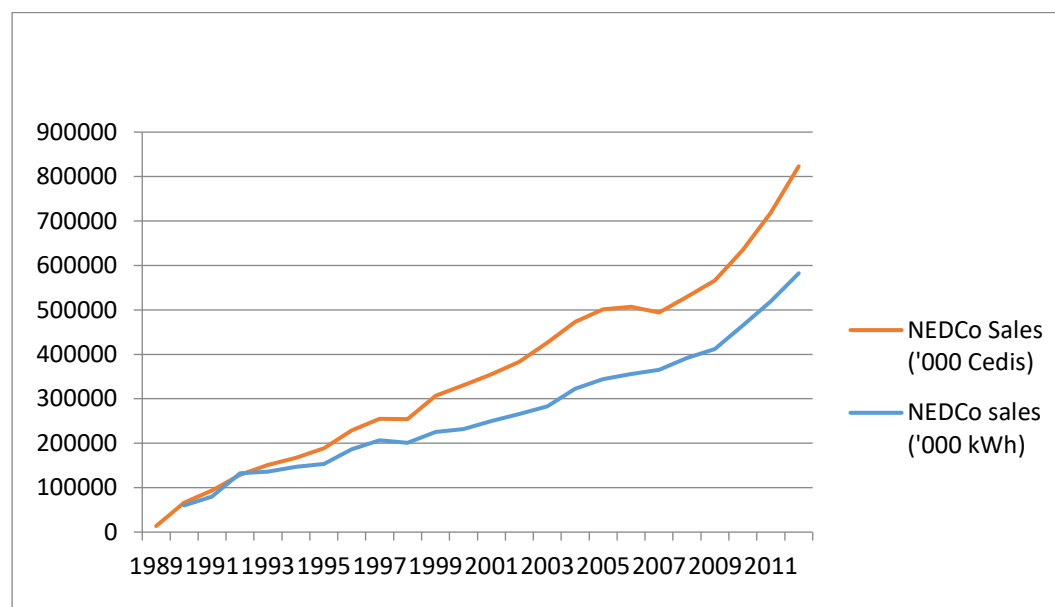
**Figure 37: Electricity customers by utility, Ghana, 2000-2011.**

**Source: Energy Commission (2013).**

Throughout the 2000s, as figure 37 shows, the number of NED's urban and rural customers skyrocketed. NED's sales also leapt (see figure 38 below). But residential customers continued to dominate NED's customer base, to the extent that the industrial base remained negligible. In February 2003, within that overwhelming majority of residential customers, those with the lifeline tariff accounted for 13% of electricity used, those with 50-300 kWh per month, 67%, and the rest with over 300 kWh 18%. The second cohort consumed almost five times more electricity per capita than the lifeline group (Keener and Banerjee 2005). Even in 2011, the scope for growth of the industrial segment of customers remained very limited (see table 24 below, specifying the prospective industrial customers in 2011 according to their prospective capacity in megavolt-amperes, MVA). NED's dependence on domestic tariffs, set homogeneously for the whole country irrespective of power purchase, forced it to operate on losses. In addition, the low number of industrial customers, some 30-40, eliminated the possibility of a cross-subsidy from industrial to residential customers. Inevitably, NED's losses increased as it connected more low-income, distant, rural customers under the lifeline tariff (see figure 39). In 2014 NEDCo lost an estimated US\$ 140 annually per new customer supplied, and 'this cost is currently funded mainly by VRA, as NEDCo fails to generate sufficient income to pay for all the electricity supplied' (AF-MERCADOS EMI 2014, 35). Providing electricity to customer populations many of which were dwelling dozens of

kilometres downstream from medium- and low-voltage lines made profitability an unrealistic prospect. On average, as of 2012 each customer of NEDCo required 44.61 metres of line to be supplied, well above the regional benchmark (AF-MERCADOS EMI 2012).

**Figure 38: NED sales (GHS and kWh), 1989-2012.**

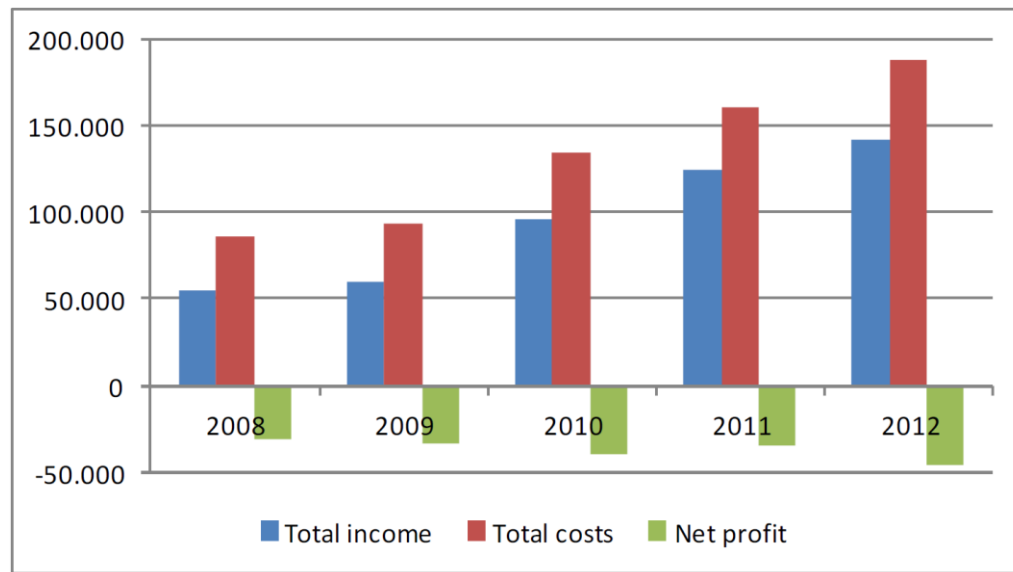


Source: Unpublished NEDCo data, VRA Annual Reports and Energy Commission (2013).

**Table 24: NED's prospective industrial customers in 2011.**

| Region     | Project             | Capacity (MVA) | Expected Year | Average demand (MVA) | Annual energy (GWh) | Estimated peak demand (MVA) |
|------------|---------------------|----------------|---------------|----------------------|---------------------|-----------------------------|
| Northern   | Aluminium Com.      | 5              | 2014          | 3.25                 | 14.00               | 3.8                         |
| Northern   | Hospital Upgrade    | 5              | 2013          | 3.25                 | 13.3                | 3.8                         |
| Northern   | Rice Factory        | 2.5            | 2013          | 1.63                 | 6.6                 | 1.9                         |
| Northern   | Sugercane Com.      | 5              | 2014          | 3.25                 | 13.3                | 3.8                         |
| Northern   | Steel Factory       | 2              | 2015          | 1.3                  | 5.3                 | 1.52                        |
| Upper East | Goldmine            | 5              | 2015          | 3.25                 | 13.3                | 3.8                         |
| Upper West | GWCL                | 3.5            | 2015          | 2.03                 | 10.1                | 2.66                        |
| Upper West | Goldmine            | 10             | 2015          | 6.5                  | 26.5                | 7.6                         |
| Upper West | Cross border Supply | 4              | 2015          | 2.33                 | 6                   | 3.04                        |
| Upper West | Cross border Supply | 2.5            | 2014          | 1.5                  | 4                   | 1.9                         |
| Upper West | Regional Hospital   | 1              | 2013          | 0.65                 | 6.5                 | 0.76                        |
| TOTAL      |                     | 45.5           |               | 28.94                | 118.92              | 34.58                       |

Source: VRA/NEDCo (2013).

**Figure 39: Evolution of NED's losses ('000 GHS), 2008-2012.**

**Source: AF-MERCADOS EMI (2014).**

NED's losses were mounting even though the policy context in Ghana was changing in the 2000s in favour of tariff increases. In part, such losses were provoked by the government itself. In October 2013 NEDCo informed that 'the MDAs [Municipal and District Assemblies] and other sensitive customers (hospitals, military, police, prisons, GBC [Ghana Broadcasting Corporation], GWSC [Ghana Water and Sewage Corporation], etc) debts constitute about GHS42.7m being 45% of our receivables' (NEDCo 2013c, 8). But the new buzzword in policy circles was full-cost recovery (World Bank 2013b). The MoE embraced the narrative, even though its policies were less enthusiastically geared towards full-cost recovery.<sup>77</sup> VRA's top management, progressively more business-oriented, concurred.<sup>78</sup> The drift towards full-cost recovery in Ghana was not only ideological, though. It also reflected the growing salience of residential demand. Between 2000 and 2013, residential customer demand increased by 118%, whilst industrial demand virtually stood still. As a result, if in 2000 the ratio between industrial and residential demand was 2.9, by 2013 it had dropped to 1.31 (EC 2014). The

<sup>77</sup> See, for instance, World Investment News, "Interview with Hon. Albert Kan Dappah Minister of Energy", *World Investment News*, April 5, 2001. <http://www.winne.com> (accessed May 21, 2013).

<sup>78</sup> See Channel Two. 2013. "Edited transcript of David's interview with Kwaku Awotwi, Chief Executive of the Volta River Authority". <http://timewithdavid.com> (accessed May 30, 2013). The full video interview was available at <http://timewithdavid.com>.

reaction of the incumbent NPP government to the new ideological and sectorial scenario was mixed (Keener and Banerjee 2005). In 2006 a second wave of sectoral reforms led to unbundling VRA into generation and transmission, but NED was unaffected. Transmission was entrusted to a new public utility, the Ghana Grid Company (GRIDCO) (Kapika and Eberhard 2012). According to a senior VRA executive, the aim was clear: 'GRIDCo was formed to attract IPPs' (VRA Director of Business Planning and Development 2013). The government acknowledged the need for tariff increases, but at the same time it sought to avoid creating popular unrest. Throughout the 2000s several successive tariff adjustments took place. In 2003 an automatic adjustment mechanism was introduced but survived only until 2006. It was temporarily recovered in 2010 and 2013 (Kapika and Eberhard 2012, 228–29).<sup>79</sup> As a result, tariffs sharply increased periodically, particularly in 2006 and 2010, leading to a substantial rise overall over the years (see figure 40 below). However, tariff hikes mostly affected the relatively well-off customers in or above the 100-kWh monthly threshold. Also, the Public Utilities Regulatory Commission's (PURC) tariff hike in 2006 was not effectively applied finally, as the government opted to subsidize the increase with the national budget. The government tried to protect low-income customers from politically unpalatable, and potentially explosive, tariff increases (Kojima, Bacon, and Trimble 2014) and, for that purpose, a lifeline tariff for households under 50 kWh of monthly consumption was put in place (ESMAP 2006). The lifeline tariff was set well below the cost of production and distribution, amounting, after the last adjustment in October 2013, to only 16% of that cost (Kapika and Eberhard 2012, 231).<sup>80</sup> Tariffs never reached the point of full cost-recovery (World Bank 2013a). The mechanism for tariff setting envisaged the same tariff across the country, enacting a *de facto* cross-subsidy from urban to rural customers (Kapika and Eberhard 2012, 224). For rural (and, in part, non-rural) dwellers in the North, the homogenous national tariff also effected an overall subsidy from South to North, as the cost of supply remained higher for distant rural settlements in the north of Ghana. For NED, however, with a customer base in which the rural, low-income component gained weight as rural electrification gathered momentum throughout the 2000s, the homogeneous national

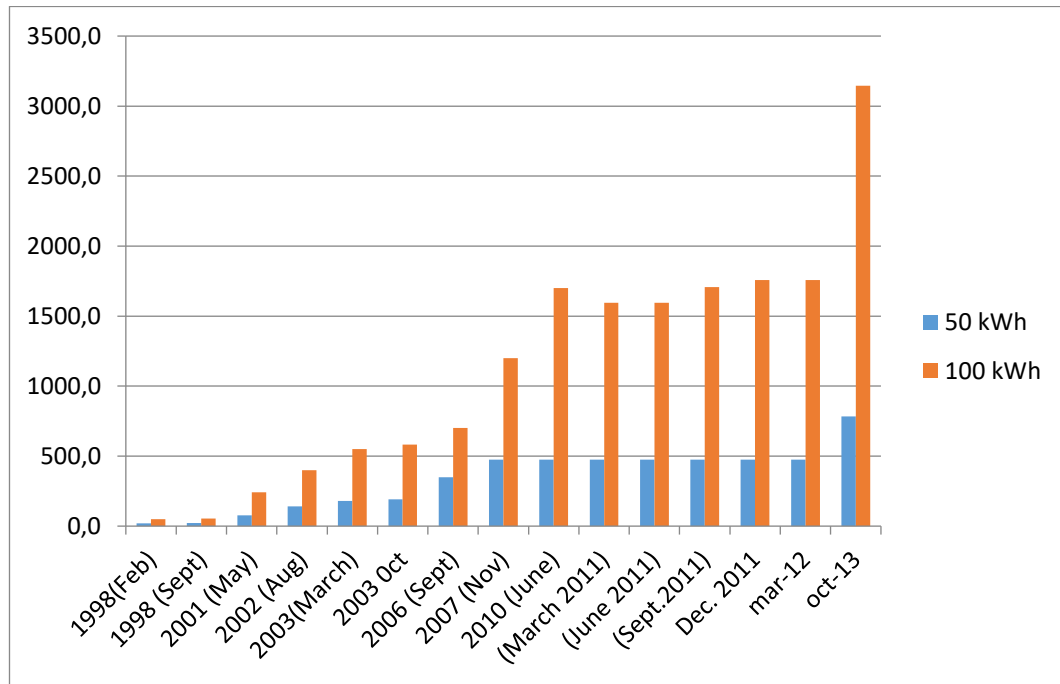
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<sup>79</sup> It remains unclear whether the tariff adjustment that entered into effect on October 1, 2013 was calculated in line with the automatic adjustment formula or not.

<sup>80</sup> The figure for the subsidy is based on own calculations using the 'October 2013 Reckoner' obtained from ECG. <http://www.ecgonline.info> (accessed November 24, 2013).

tariff, and the lifeline tariff, could only further aggravate the already delicate situation of its balance sheet. In 2011, NEDCo's operating losses amounted to GHS 46 million (MCA 2012a).

**Figure 40: Trends in residential tariffs (real Ghana cedis, GHp).**



Source: PURC and ECG.<sup>81</sup>

If NED's situation remained mostly the same throughout the 2000s, the same could not be said of VRA. By 2002, the combined losses of VRA, ECG and NED amounted to 11% of public spending, or 4% of the GDP (Keener and Banerjee 2005). VALCO, the huge aluminium smelter and a major off-taker of electricity from VRA, suspended operations from 2003 through 2011.<sup>82</sup> VALCO's closure was requested by the government in 2003 as Ghana was hit again by nationwide power shortages. As a consequence, peak demand in Ghana dropped from 921 to 781 MW from 2000 to 2003 (EC 2006a, 2012). Most crucially for NED, VRA was facing

<sup>81</sup> Data supplied by the Assistant Manager in Regulation in PURC. The figure for October 2013 is based on the 'October 2013 Reckoner' obtained from ECG. <http://www.ecgonline.info> (last accessed November 24, 2013).

<sup>82</sup> Even so, in 2011 VALCO put into operation only two of its five potlines. In 2006, VALCO also briefly re-opened two of its potlines (EC 2012).



severe financial problems for the first time since its establishment (World Bank 2007a). As a result, perceptions amidst donors about NED slowly started to change. Still in 2007, with VRA navigating dire straits, the World Bank did not seem seriously concerned by NED's financial situation:

Although NED's tariffs cover only 48% of its costs and its collection rate is about 86%, the company is small and its performance, while in need of improvement, is far less critical to the overall power supply situation than the respective roles of VRA and ECG (World Bank 2007a, 4).

By the late 2000s, VRA's balance sheet had deteriorated further. The pressure to reengineer the distributional settlement in the North, in which VRA played such a crucial role, mounted accordingly. As a result, in May 2012 NED mutated from a subsidiary department within VRA into a fully independent subsidiary utility called NEDCo. Indeed, few things changed overnight. The revenue collected by NEDCo continued to be directed into VRA's accounts as of late 2013. Also, the cash flow from NEDCo continued to afford the only recurrent source of liquid funds for VRA, as the latter's core business consisted of selling power to ECG and bulk consumers. VRA's interest in NEDCo's recurrent income was illustrated by the fact that the last batch of 100,000 prepaid meters NEDCo was to install was provided by VRA (NEDCo Principal Marketing Officer 2013). Symbolically, the change was dramatic. NEDCo was finally put on equal footing with ECG as a distribution company. The move signalled the first serious attempt in its 25 years of existence to treat the northern utility as a mature, full-fledged parastatal. NEDCo's new status in Ghana's national electricity regime was enshrined by the signing, after years of negotiation, of the Ghana Power Compact in August 2014 between the Millennium Challenge Corporation of the United States and the Ghanaian government.<sup>83</sup> The Compact envisaged substantial investments and reforms in NEDCo's management to put the utility on the road to financial sustainability within a few years. A due diligence conducted in early 2014 gauged the actual condition of NEDCo (AF-MERCADOS EMI 2014). The fact that the Ghana Power Compact included NEDCo expressed a new intensified interest of donors in what for years if not decades had remained ECG's younger brother.<sup>84</sup>

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<sup>83</sup> See <https://www.mcc.gov/where-we-work/program/ghana-power-compact> (accessed December 14, 2016).

<sup>84</sup> The relative weight conceded by the Ghana Power Compact to NEDCo and ECG can be roughly assessed even quantitatively. It envisages to invest a maximum of 10% in NEDCo.

The Power Compact was also in line with the efforts that NED itself had already initiated to redress its financial health. Given that NED could not alter its customer base, by and large imposed by the NES, or the national tariffs, NED staff attempted to reduce its commercial losses by introducing prepaid meters. Prepaid meters, originally piloted in the late 1990s, started to be mainstreamed one decade later (Former NED Commercial Manager 2013; NEDCo Head of Public Affairs and Community Relations 2013). Their introduction paid off in the first years, and commercial losses diminished accordingly (see figure 36 above). That is proved, for instance, by the increase in the ratio of sales expressed in cedis to sales expressed in energy units (see figure 38 above), which grew gradually. Also, attendant tariff increases contributed to relieve NED's dismal financial health. Overall, however, the introduction of prepaid meters only mitigated NED's pains temporally. Prepaid meters proved insufficient to overcome the challenges to financial sustainability posed by NED's customer base and its attendant geography and demography.

According to the views prevailing amongst senior NEDCo and VRA staff, particularly in Accra, full-cost recovery was the only solution over the long term to the utility's financial woes. Kweku Awotwi, Chief Executive Officer of VRA in 2013 was singularly vocal in its advocacy for full-cost recovery. As he notoriously stated: 'If we want to remain poor, let's keep subsidising the tariff'.<sup>85</sup> Also, current tariffs were thought to be set so low that they did not even cover the cost of the electricity bought to VRA (Former NED Commercial Manager 2013). NEDCo consistently asked PURC for major increases in the lifeline and general domestic tariffs as a solution for its recurrent losses (NEDCo Head of Public Affairs and Community Relations 2013).

The PURC tariff structure has an in-built cross-subsidization mechanism whereby the commercial/large users subsidize the lifeline and other residential customers. However, inadequate industrialisation in the NEDCo's operational area has deprived it of the benefits of the cross-subsidisation policy embedded in the PURC tariff. NEDCo does not enjoy the benefits of the policy since there are only a few commercial/large users (17.75%) in its catchment area. About 82.05% of its customers are residential, half of which are lifeline. PURC has been calculating the NEDCo's tariff based on the ECG

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<sup>85</sup> Channel Two. 2013. "Edited transcript of David's interview with Kweku Awotwi, Chief Executive of the Volta River Authority." <http://timewithdavid.com> (accessed May 30, 2013). The full sentence reads: "If we want to remain poor, let's keep subsidising the tariff. But if we want to become a developed nation then we must get used to what is required."

customer profile and cost structure which is not adequate for NEDCo's peculiar conditions (NEDCo 2013c, 8).

NEDCo somehow felt vindicated in October 2013, as a tariff increase wrought an average rise of 78.9%. Its impact was nonetheless lessened to some extent for a fraction of the customers, since utilities originally lobbied PURC for higher increases. But the hike was inevitably met with outrage amongst customers and other layers of Ghanaian society.<sup>86</sup> Despite a general inclination toward full-cost recovery, NEDCo staff's impressions about the most appropriate level for tariffs were mixed in Tamale. As far as rural customers are concerned, NEDCo staff in Tamale acknowledged the urge to attain at least a breakeven point. At the same time, one official recognized that the funds invested in rural extension came at the price of compromising the quality and reliability of supply in urban areas (NEDCo Principal Marketing Officer 2013). The range of solutions offered by NEDCo staff and other electricity sector stakeholders was wide. One solution implied enacting cross-subsidies from big customers to residential ones (Former NED Commercial Manager 2013). Another solution was to set up a special rural tariff, funded through a levy on the relatively well-off urban customers who could ultimately subsidize rural dwellers (NEDCo Principal Marketing Officer 2013). Others preferred to accrue revenue for NEDCo from neighbouring countries, ie southern Burkina Faso, and northern Togo and Côte d'Ivoire. By transferring to NEDCo the customers of neighbouring countries now supplied by VRA, the utility would gain a most valuable source of foreign currency. Also, the tariffs would be set according to purely commercial criteria, as is always the case in the exports of VRA (NEDCo Principal Marketing Officer 2013; VRA Director of Business Planning and Development 2013). Another solution was to redraw the area NEDCo supplied to include some affluent regions currently supplied by ECG (Energy Commission of Ghana Official 2013; NEDCo Planning Engineer 2013). Lastly, for others the ultimate solution laid in merging NEDCo and ECG, even though previous attempts had purportedly failed due to the difficulties inherent in assimilating the salaries in both utilities (Former ECG Board Chairman 2013; Former NED Director 2013).

Most importantly, the extant distributional settlement that saw customers in the North being cross-subsidized by the generation segment (through VRA) and customers in the South

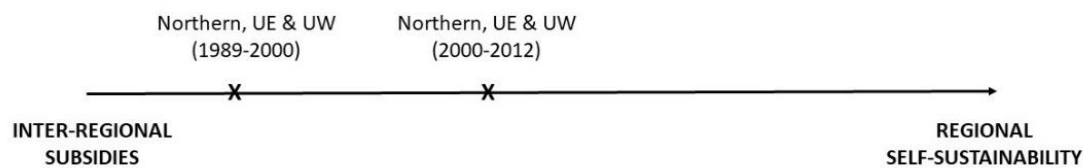
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<sup>86</sup> Daily Graphic, September 26, 2013. <http://graphic.com.gh/archive/General-News/utility-tariffs-go-up.html> (accessed February 14, 2014).

(through the nationwide tariff) started to fall apart once VRA's balance sheet progressively deteriorated. Additional factors, such as the ideological tide in favour of full-cost recovery, also contributed to a renewed pressure from donors and multilateral institutions that crystallized in the separation of NEDCo from VRA and the inclusion of the former in the Ghana Power Compact. Both moves signalled a new policy approach to supply in the northern regions, which aimed to make electricity supply fully economically self-sustainable, whilst still subsidizing access for rural customers through the development budget.

The overall qualitative evolution of the distributional territorial settlement in the provision of electricity across northern Ghana is represented graphically in figure 41 below. It portrays an axis with regional financial self-sustainability at one end and inter-regional subsidies (that is, from outside the region) at the other. The axis has been constructed following the views of informants in the power sector both in the North and Accra. Interviewees overwhelmingly stated that the purpose of electricity policies and NED in the long term ought to be financial self-sustainability. As the settlement for northern Ghana remained basically the same for the three regions, Northern, Upper East and Upper West, the figure conflates them into one single point. It shows how, in the first period, from 1989 to 2000, cross-subsidies flowed to the North, both from profits in the generation segment (via VRA) and the national tariffs. This did not preclude, however, the accumulation of losses on NED's balance sheet (indeed, VRA's balance sheet). Nonetheless, these losses were deemed relatively irrelevant by both policymakers and donors, given the small size of NED's customer base. In the second period, from 2000 through 2012, the deterioration of VRA's balance, the recurrent power crises, and the new ideological tides in favour of full-cost recovery, displaced the territorial strategy of provision, at least on paper, closer to regional self-sustainability. The move was a result of the new configuration of the distributional settlement in the national electricity regime that "travelled down" to the regions, including the North, since no specific tariff arrangement was implemented nationwide either for northern electrification or rural electrification.

**Figure 41: Territorial strategies in the provision of electricity in northern Ghana, 1989-2012.**



**Source: Own elaboration.**

### **5.2.3. Minimizing subsidies: Southeastern Tanzania, 2004-2012**

In stark contrast to northern Ghana, southeastern Tanzania could count upon the existence of a local, cheap source of power. In the eyes of MEM policymakers in Dar es Salaam, the region changed its condition overnight from a recipient of subsidies for expensive diesel generation to a credible candidate for avant-garde policy operating without the need for subsidies. Pre-figuring a model that a section of Tanzanian policymakers and certainly donors wanted for the whole of Tanzania, southeastern Tanzania was subject to a territorial strategy of provision with the ultimate aim of minimizing subsidies. This territorial strategy ran contrary to the prevailing settlement in Tanzania's national electricity regime, in which all customers were heavily subsidized by the state through TANESCO.

The scheme to franchise provision in southeastern Tanzania reinvigorated earlier attempts to lure the private sector into exploiting the gas riches of the southeast and distribute electricity in the region. It is doubtful however that on this occasion the MEM had conceived of this plan as part of a comprehensive strategy, or that the new business model in the southeast heralded new realities for the whole the power sector. The scheme seemingly resulted from a critical conjuncture in which the interest expressed by Artumas to expand its activities in Mnazi Bay and monetize gas resources ostensibly provided the final boost. At any rate, the southeast, now sitting atop gigantic bags of gas, would provide the laboratory for the new model, as this approach had never been implemented anywhere else in Tanzania. In fact, the scheme's implementation marked a major departure from earlier approaches in the country, in which private involvement had been limited at most to selling power as Independent Power Producers. The National Energy Policy of 2003, by contrast, signed ownership contracts as a novel approach in the distribution sector to foster private

involvement. However, no hint was provided at the time as to where these experiments for private participation would be implemented first. Most importantly, the Energy Policy avoided any mention of unbundling the distribution sector, an almost inevitable prerequisite for increased private involvement. This was so in spite of two earlier hallmark reports elaborated by external consultancies recommending unbundling the distribution sector: the Mercados Energéticos' report of 2002 and Stone & Webster's of 2003 (MEM 2014). In the domain of rural electrification, not a single mention was made of private participation, except for the marketing of products specific to this segment. The Mtwara Energy Project emerged as a singularity in the menu of policy fixes, seemingly stemming from the intersection of fresh perceptions about the region in the capital and the imperatives of policy reform and new approaches.

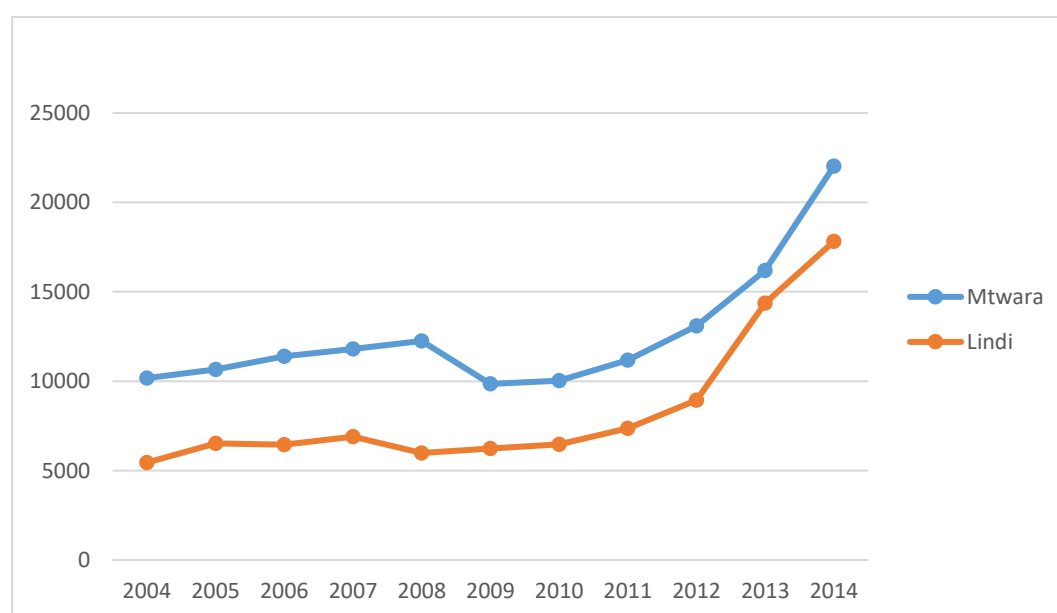
The gas-fired, private-owned power plant in Mtwara commissioned on December 24, 2006 ushered in a new era. With its inauguration, the region secured, for the first time since electricity arrived in the 1950s, an abundant and stable source of power (Caterpillar 2010). The plant was completed only three years after the long-awaited bridge over the Rufiji River. If the Mpaka Bridge materialized decades of unfulfilled governmental pledges to communicate Dar es Salaam and Mtwara through an all-weather road (Mesaki and Mwankusye 1998), the power plant came to meet the high expectations triggered by finding trillions of cubic feet of gas. The plant only received more credit in 2010 when it augmented its capacity from 12 to 18 MW, safely in excess of demand. The plant helped stabilize the power supply for existing customers in Mtwara town. Erstwhile recurrent cut-offs were made bearable. The plant also ameliorated supply to large customers in the region, the largest of all being the water supply scheme in Newala, which by then employed three pumps and served medium voltage (11 kV). Other large customers also benefitted: the prisons, the police, the cashew nut industries, as well as the port of Mtwara. Over time the plant contributed to densify connections across already served areas, singularly urban ones. Between 2004 and 2014 the customer base rose sharply from 10,000 to about 20,000 due to the combined effects of densification and extension.<sup>87</sup> Lured by the abundance and reliability of electricity, industrial projects, amongst them the Dangote cement factory, progressively started to show an interest in settling in Mtwara or Lindi. The plant, backed by the abundance

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<sup>87</sup> Source: TANESCO Head Office unpublished data.

of gas exploited by the private company Artumas, also contributed to engineering an array of transformations in electricity provision in the region. One major transformation coincided in time with the plant's inauguration. Pre-payment meters were introduced the same year, reaching 6,000 customers in less than a decade. The rapid diffusion of prepayment meters reflected a TANESCO's nationwide policy of implementing all new connections under the prepaid system, and consequently achieve full rollout of prepaid meters by 2016.<sup>88</sup> This policy was pursued to such degree that by 2014 postpaid card meters had been allegedly phased out except in a few locations where pre-payment metering had started as pilots (TANESCO Mtwara Regional Engineer 2014). All in all, the above suggested for the first time in the region the possibility of diversifying the customer mix with the addition of a sizeable base of industrial customers that could cross-subsidize residential ones (TANESCO Masasi District Manager 2014; TANESCO Mtwara Regional Accountant 2014; TANESCO Mtwara Regional Engineer 2014; TANESCO Mtwara Regional Manager 2014; TANESCO Senior Manager Distribution 2014; TANESCO South Zonal Manager 2014).

**Figure 42: Number of customers in Mtwara and Lindi, 2004-2013.**



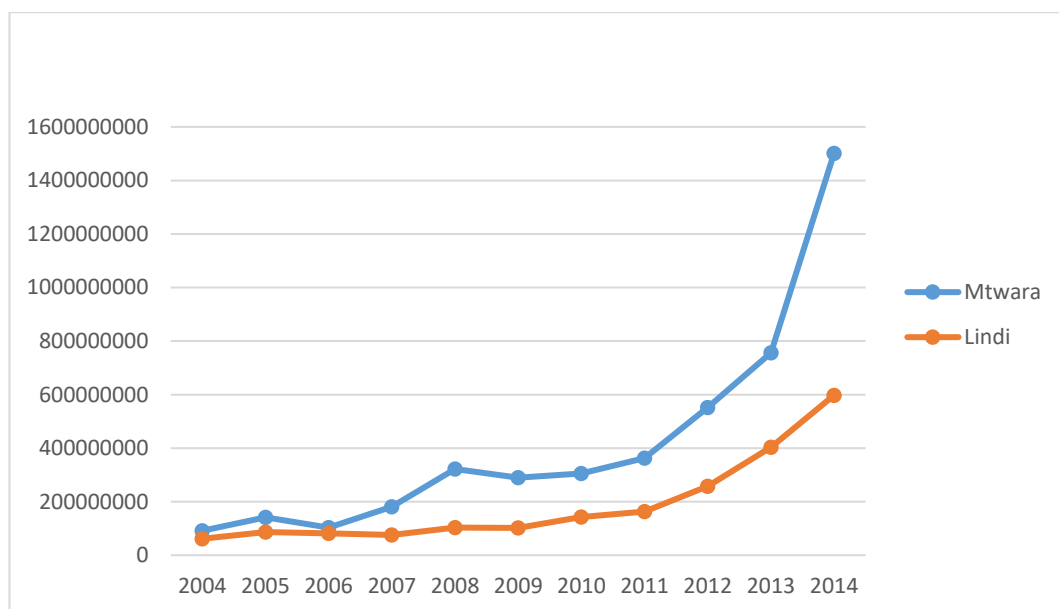
**Source: Unpublished data from TANESCO.**

<sup>88</sup> As of mid-2014, the keypad-type meter was the only device being deployed throughout the region, despite its disadvantages for the Regional Office; processing consumption, checking remaining credit as well as other verifications still had to be conducted onsite.

In the short term, Artumas' efforts to reach new customers did not yield results. The customer base barely grew in Mtwara and Lindi between 2004 and 2010, as figure 42 above shows.

Similarly, revenue collection did not take off until 2011-12 (see figure 43 below). These numbers show very clearly that the Mtwara Energy Project failed to increase revenue generated from distribution. Even though it is likely that generation at the power plant remained profitable, the whole scheme did not provide the anticipated returns.

**Figure 43: Revenue collected (TZS) from electricity sales, Mtwara and Lindi, 2004-2014.**



**Source: Unpublished data from TANESCO.**

At the same time, the tariffs TANESCO charged, and EWURA set, increased substantially. Table 25 summarizes the average tariff increases from 2007 to 2013. Unsurprisingly, such increases brought the tariff in the early 2010s to US\$ 0.14 per kWh, only US\$ 0.03 per kWh below the cost of generation and distribution (Kojima and Trimble 2016; Trimble et al. 2016).



**Table 25: Tariff increases in Tanzania, 2007-2013.**

| Date          | Increase in tariff (%) |
|---------------|------------------------|
| December 2007 | 21.7                   |
| December 2010 | 18.5                   |
| January 2012  | 40.29                  |
| January 2013  | 0                      |
| December 2013 | 39.19                  |

**Source: Peng and Poudineh (2016).**

The Mtwara Energy Project from 2004 to 2012 aimed to push operations in Mtwara and Lindi closer to a commercial logic of financial self-sustainability. Although the actual figures are not available, a reasonable assumption is that Artumas intended to provide electricity to General Usage (T1 tariff) customers at a cost below the tariff, and benefit from a subsidy from the government for the electricity sold below cost to Domestic Low Usage (D1), mostly lifeline, customers.<sup>89</sup> According to Artumas' estimates, electricity would be sold at a bus-bar tariff of US\$ 0.0825 per kWh (Ngwale 2006), plus a regulated distribution cost. This had varying implications for two different customer categories. For customers in the General Use category, the retail tariff in Mtwara and Lindi would be below the average tariff of approximately US\$ 0.09 per kWh that existed in 2005. On the contrary, for low-income customers the tariff at which Artumas intended to sell electricity remained above the approximately US\$ 0.07 per kWh in 2005 (Hoogeveen 2007; Kapika and Eberhard 2012). Artumas would therefore require subsidies for the lowest band of customers. But Artumas estimated in 2010 that 'tariff approval received will provide sufficient cash to recover costs and earn a profit but only if the Government also provides Tariff Equalisation Funds and Grant Funds' (Wentworth Resources Ltd. 2010, 17).<sup>90</sup> But besides General Usage and Domestic Low Usage customers, the success of the Mtwara Energy Project rested to an even larger extent on the emergence of an industrial demand. Unsurprisingly, Artumas repeatedly expressed a keen interest in gas monetization projects (Wentworth Resources Ltd. 2011b, 2011a, 2013b).

<sup>89</sup> Domestic Low Usage (D1) applies to customers 'who on average consume less than 75 kWh per month. Any unit exceeding 75 kWh is charged a higher rate of TZS 350 per kWh. Under this category, power is supplied at a low voltage, single phase (230V)...General Usage (T1) [applies to] customers including residential, small commercial and light industrial use, public lighting and billboards. Power is supplied at low voltage single phase (230V) as well as three phase (400V)' (EWURA 2016, 8).

<sup>90</sup> The Tariff Equalization Fund is 'a fixed-value account designed to make up the difference between the national tariff and the cost-based tariff (which would otherwise be charged to the final consumer)' (Eberhard et al. 2016, 309).

The Mtwara Energy Project aimed to provide electricity to general customers at a price below the extant tariff, in blatant contrast to the settlement in the rest of Tanzania. In 2005, TANESCO's average cost of distribution was US\$ 0.10 per kWh, three cents above the average tariff of US\$ 0.07 per kWh (Hoogeveen 2007; Kapika and Eberhard 2012). Building on the local availability of cheap gas, the Mtwara Energy Project sought to minimize the volume of subsidies needed for electric provision, confining them to the lowest bracket of customers, ie lifeline customers.

#### **5.2.4. Subsidizing disgruntled customers: Southeastern Tanzania, 2012-2015**

The failure of the Mtwara Energy Project, and the local grievances associated with the extraction of gas from the region, contributed to ushering in a fresh territorial strategy of provision in southeastern Tanzania. As the government started to put in place policies to increase access and, consequently, the number of low-income customers grew, the territorial strategy of provision drifted towards accommodating more public subsidies channelled through the lifeline tariff. The general assumption in the MEM, as well as in TANESCO, was that the region had to be operated profitably in the medium term. To that end, the government was supposed to incentivize the industrialization of the south east to attract a sufficient number of industries ultimately capable of cross-subsidizing residential and commercial users, in particular the overwhelming majority of lifeline customers. In the meantime, the government would provide the subsidies required to make electricity available for every household in the region, regardless of its distance to the grid.

The prevailing assumptions were echoed in the views that prevailed amongst TANESCO staff in Mtwara, in general professedly aligned with the government's strategy. One major assumption was that the industrialisation drive would offset the losses incurred from providing power to low-income households (TANESCO Masasi District Manager 2014; TANESCO South Zonal Manager 2014; TANESCO Tandahimba District Manager 2014). Similarly, enacting full-cost recovery would help attract badly needed foreign investment in generation and transmission (TANESCO Senior Manager Strategic Planning 2014), and instil a healthy principle of financial sustainability in each region (TANESCO Masasi District Manager 2014). Full-cost recovery would be compatible with other types of cross-subsidies: for instance, the transient geographical cross-subsidy from grid users to isolated, costly diesel

generation plants in towns such as Kigoma or Songea, which also benefitted Mtwara before the power plant was built (TANESCO Senior Manager Distribution 2014); or the *de facto* subsidy from hydro and gas to diesel, and from grid to off-grid customers (MEM Tanzania Assistant Commissioner Energy Development 2014; TANESCO Senior Manager Distribution 2014), instilled by the 'uniform' or 'pan-territorial' tariff created by the Electricity Act (EWURA Officer 2014). In general, full-cost recovery would not necessarily run contrary to the extant governmental policy requiring TANESCO to connect and serve every customer regardless of location, even when that negatively affects its profits and losses account. The only obstacle for any sort of cross-subsidy would be Section 23 of the Electricity Act of 2008, which forbids any cross-subsidy between different categories of users (but not governmental subsidies) (EWURA Officer 2014; TANESCO Senior Manager Distribution 2014). The lifeline tariff would be an appropriate example of a fine-tuned subsidy balancing needs and income, benefitting not only the rural poor but the urban poor as well (TANESCO Mtwara Regional Engineer 2014). The further extension of the lifeline tariff would help address the problem of affordability in rural areas, palpable in the number of households that rely on solar lamps, not electricity from the mains (TANESCO Masasi District Manager 2014). One lasting step in the right direction would see the connection of the mini-grid in the South East to the national grid (TANESCO Senior Manager Strategic Planning 2014).

Before that, and after the Mtwara Energy Project came to its end, the policy benefits accorded to Mtwara and Lindi propelled the number of customers in Mtwara and Lindi to new heights in 2013 and 2014 (see figure 42 above). Revenue collection followed suit. In this period, electricity TANESCO acquired from Wentworth at US\$ 0.1195 per kWh, according to the Interim Power Purchase Agreement (K. N. Gratwick 2007; Wentworth Resources Ltd. 2011b). Given that the average tariff in this period was around US\$ 0.14 per kWh (Trimble et al. 2016), it is reasonable to assume that TANESCO supplied at least the customers in the General Usage category in Mtwara at a profit. It is impossible however to know precisely since the customer management software TANESCO employed is unable to generate regionally disaggregated reports comparing costs and revenue (TANESCO Senior Manager Distribution 2014). As far as industrial demand is concerned, it continued to grow slowly, even though flagship projects, the most notorious amongst them the Dangote cement factory, started to take shape. Dangote's factory, however, was equipped with its own autonomous 30-MW power plant. Overall, the territorial strategy of provision implemented

from 2012 to 2015 over Mtwara and Lindi did not change dramatically with respect to the previous period. One significant change, however, was the likely increase in the number of lifeline tariff customers, facilitated by the policy incentives to promote access. This signalled a return to more developmental electrification policies premised upon the preponderance of subsidies over policy designs intent on minimising them.

Nationwide, however, the policy drift pointed in the opposite direction. The Electricity Supply Industry Reform Strategy and Roadmap 2014-2015 advocated with renewed vigour for private regional franchises across Tanzania, Mtwara and Lindi included. The MEM scheduled the adjudication of private regional distribution franchises for an unspecified period after 2021, upon the prior unbundling of the distribution segment (MEM 2014). TANESCO's financial condition continued to be weak although it had improved thanks to the tariff increases of previous years.

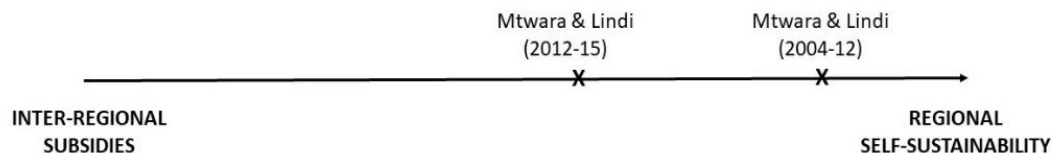
The employment of improved low-cost technologies and higher subsidies imbedded in the tariff (on average 51 percent for rural customers and 35 percent for urban customers who pay the lowest subsidized tariff) made the electricity cost more affordable (World Bank 2016, 8).

At the end of December 2013, TANESCO's debts had dropped from to US\$ 167 million from 276 million in the previous year (PER Working Group, Ministry of Finance, and World Bank 2013). In May 2014, TANESCO owed US\$ 320 million to suppliers and gas developers (World Bank 2014). By 2016, this debt still amounted to US\$ 300 million, equivalent to 0.7 of the national GDP. At the same time, the government owed TZS 200 billion, which it cleared in 2016 (IMF 2016). However, for the first time since 2009, TANESCO concluded the fiscal year 2015 with an operating surplus of TZS 179 billion (World Bank 2016).

Figure 44 below captures the evolution of the distributional settlement in Mtwara from 2004 through 2015. In the first period, under the Mtwara Energy Project, the prevailing settlement reflected an attempt to attain economic sustainability. Economic sustainability rested on the assumption that the cost of distributing electricity from the private power plant would remain below the national retail tariffs set by EWURA. At the very least, the assumption was that the cost of providing power to a growing urban customer base in Mtwara would offset the costs derived from sending power to rural customers. This presumed settlement positioned Mtwara from 2004 to 2012 considerably closer to a policy of no-subsidies than

the rest of the country. However, the Artumas/Wentworth business plan ultimately proved unrealistic, and TANESCO stepped back in. From then on, the growing unrest in the region, spurred by the upcoming completion of the pipeline to Dar es Salaam, urged the government to subsidize the densification of connections in already supplied areas by means of lower fees especially designed for the Mtwara and Lindi regions. This steered both regions slightly away from the policy of minimizing subsidies towards an increase in state subsidies from relatively well-off electricity users in the country and taxpayers in general. The drift was nonetheless moderate, since sectoral policies in Tanzania were simultaneously advancing towards national electricity tariffs increasingly premised on the notion of full-cost recovery.

**Figure 44: Territorial strategies in the provision of electricity in southeastern Tanzania, 2004-15.**



**Source: Own elaboration.**

### 5.3. Conclusion

This chapter set out to analyse the influence of the disparate national electricity regimes of Ghana and Tanzania in the strategies deployed by central governments to provide electricity on a regular basis to customers in its northern and southeastern peripheries, respectively. It has reviewed the evolution of the territorial strategies of electrification over the two regions: northern Ghana, from 1989 to 2012, and southeastern Tanzania, from 2004 to 2015. The analysis has prioritised one angle: the geographical articulation of the cross-subsidies between categories of customers, and between customers and the state. This exercise has yielded a graphic representation of the nature of cross-subsidies to compare at a glance the diverging trajectories of northern Ghana and southeastern Tanzania. To better grasp the nature of the territorial strategies used, this chapter has compared the provision strategies in northern Ghana and southeastern Tanzania with the evolution of the respective

distributional settlements in the electricity regimes on the national scale. It has briefly examined the sustainability over time of the territorial strategies of peripheral electrification.

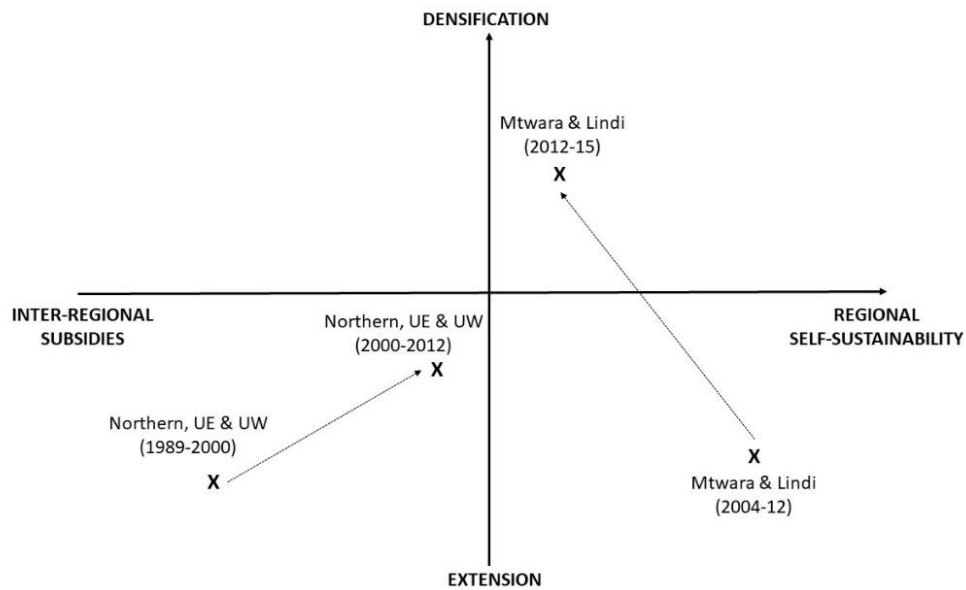
The comparative design in this chapter has found that the territorial strategies of provision were quite different. In both cases, the drift of the national electricity regime toward full-cost recovery, especially since the mid-2000s, encouraged a decline in inter-regional subsidies. Against this policy background, in northern Ghana, the government sought first to provide electricity regardless of the cost for the public coffers or NED's financial health. Later on, however, and as the number of customers operated at a loss leapt up, the government managed to maintain provision to a vast mass of low-income customers by occluding the scope of the subsidies within the broader balance sheet of VRA. This territorial and organizational strategy entailed a *de facto* cross-subsidy from generation to distribution and from the more developed south to the north through state subsidies to lifeline customers. In a sense, then, the territorial strategy in northern Ghana ran contrary, or at least in opposition, to the policy drift inscribed in the national electricity regime, in which recurrent tariff hikes advanced toward the ideal of full-cost recovery. Southeastern Tanzania, on the contrary, suddenly became the policy avant-garde of Tanzania thanks to the regionally virtually self-contained Mtwara Energy Project. In this sense, the ultimate provision design in Mtwara and Lindi, premised on the virtual absence of subsidies (except for remote lifeline customers), prefigured the policy goals cherished by the most ardent advocates of sectoral reform. Even after the policy reorientation instilled by the retroversion of the grid assets to TANESCO in 2012, the gist of the provision strategy in southeastern Tanzania over the whole period remained closely aligned with the rules inscribed in the national electricity regime. The disparity between northern Ghana and Tanzania may be reasonably attributed to the dissimilarity in resource endowments. The strategy in southeastern Tanzania was feasible thanks to the availability of cheap, local gas for generation.

The findings about the diverging trajectories of provision in northern Ghana and southeastern Tanzania underline various points about the connections between national electricity regimes and political linkages between core and periphery. First, geographical conditions, in particular income patterns and the availability of resource endowments, are factors with which the designers of strategies of electrification must invariably contend. At the same time the analysis makes evident that geographical factors are not determining factors. Policymakers and central rulers have plenty of room to choose and manoeuvre and,

as the case of northern Ghana illustrates, they may opt to trump geographical determinism when political linkages between core and periphery call for it. Second, the political geography of access, as it is driven by political linkages between core and periphery, tends to stress the disparities in the periphery. In northern Ghana, the search of narrow political gains instilled a higher degree of divergence in patterns of electrification in comparison with the South; in southeastern Tanzania, the reaction to the grievances did similarly. By contrast, the policies adopted by national electricity regimes tend to homogenize the electrification patterns, as palpable in the evolution in both peripheries toward the reduction of inter-regional cross-subsidies.

That said, even more insights may be gained by superposing the representations of the territorial strategies of provision from this chapter and of access from the previous two chapters. The resulting representation can be found in figure 45. This qualitative representation shows for instance how over the period being studied northern Ghana remained firmly inserted in the same quadrant, whilst southeastern Tanzania moved from the lower to the upper half (from extension to densification) within the right half (regional financial self-sustainability). The figure helps to understand why this pattern is consistent with the chief disparity between both cases: the availability of a cheap local source of generation in the case of southern Tanzania. As northern Ghana had no cheap local source of generation, it remained excluded from any of the two quadrants on the right side, as that would have entailed some form of intra-regional cross-subsidy either from industry, commerce or well-off customers to the urban and rural poor. This was preempted by the abyssal developmental conditions in the region. By contrast, the abundance of cheap, local gas in southeastern Tanzania made what remains the only feasible and sustainable alternative over the long term for the electrification of poor regions in the absence of a massive state subsidy possible: tapping into a source whose cost remains below provision to the vast majority of customers. This logic was nonetheless partially compromised after 2012, when the temporary strategy of massive access to quell political unrest inevitably increased the weight of inter-regional cross-subsidies from the state and relatively well-off users from other regions.

**Figure 45: Territorial strategies of access and provision in northern Ghana (1989-2012) and southeastern Tanzania (2004-15).**



**Source: Own elaboration.**

Overall, the examination of state strategies of grid electrification in northern Ghana and southeastern Tanzania has unveiled two trajectories, one dominated by electoral calculations and the other by the response to local infrastructural grievances. Table 26 synthesises the strategies and dominant patterns identified in the two cases under scrutiny.

**Table 26: Trajectories of peripheral grid electrification in northern Ghana and southeastern Tanzania.**

| Dominant core-periphery linkage | Strategy   | Dominant spatial pattern                              |
|---------------------------------|--|---|
| Electoral                       | Rural extension & inter-regional cross-subsidies     | Substantial disparities across sub-regional districts |
| Infrastructural grievances      | Urban densification & intra-regional cross-subsidies | Atenuated disparities                                 |

**Source: Own elaboration.**



Looking at this and the previous chapters together brings to the fore one element that has punctually emerged but that has been relatively overlooked in the analysis. So far, the analysis has showed a sort of explanatory preference for the strategies designed at the core. Little detail, however, has been provided as to how the local dynamics in the peripheries have steered those strategies in new directions. The riots of Mtwara in May 2013 are an evident example of the latter. The analysis above has offered no detailed account of the mechanisms and the channels, inside or outside the political system, that led from the expression of grievances in response to the changes in the Ministry's energy policies nor has it attempted to explore how such grievances emerged in the first place, how they related to long-entrenched infrastructural grievances nurtured in the region, what actors helped to shape them in the form that they were expressed, and what advocacy and discursive coalition they crafted, or what alternative channels and repertoires of protest were tried and ultimately discarded. The same holds true for northern Ghana. The recurrent protests in Tamale in the 2010s against rising tariffs speak to the present embryonic articulation of popular protests around electricity, and the potential future eruption of "electricity riots" (like the more extensively studied food riots in Africa). More tangibly, the strategic use of slogans such as 'no electricity, no campaign' or 'no electricity, no votes' in rural communities of northern Ghana attest to the consolidation of a new political linkage between centre and periphery driven by the agency of citizens in the North. Regrettably, the rigorous study of popular mobilization around infrastructural grievances and of the political activation of communities triggered by the government's offer of a public good such as electrification, falls well beyond the possibilities of this work and has been intentionally left out. The emergence of this phenomena, however, could provide promising avenues for future research in the study of the political geographies of electrification.

## 6 Deploying prepaid meters: how utilities mediate the political economy of provision

The far-reaching deterioration in the balances of NEDCo and TANESCO in the 80s and 90s was also a crisis of poor revenue collection. In the mid-2000s, more than 25% of the electricity delivered across northern Ghana did not translate into income for the utility. The problem was technical as well as managerial, as NED very well knew. The World Bank was also acutely aware: ‘a large part of these losses are “non-technical,” ie they derive from the pilferage of electricity, billing inefficiencies and inadequate metering’ (World Bank 2007a, 34). Commercial losses in northern Ghana were closely associated to the co-existence of two modalities of revenue collection. In the urban areas, e.g. Sunyani, Tamale, Bolgatanga or Navrongo, a battalion of meter readers roamed households to furnish the commercial department with the figures that the latter needed to produce the bills. Thereafter, and upon reception of the bill, clients descended upon NED’s commercial office, generally adequately situated downtown, and settled the bill in cash. Readers were paid in line with the number of reading sheets they handed over to the utility. By contrast, in the rural areas the procedure was different. Meter reading was performed along similar lines, but bill collection was inevitably itinerant: ‘bonded cashiers’ were therefore sent to rural towns and instructed to return before the evening to deposit the cash collected. The logistical challenges in the rural areas were formidable. All conventional solutions had their own shortcomings. Firstly, cut-offs were not effective to prevent the non-payment of bills and pilferage. To perform a single disconnection, technical teams had to be dispatched over long distances. Not only vehicles were often lacking, or more commonly, assigned to commercial tasks deemed as a priority. Also, the costs of executing a disconnection exceeded those of delivering the power for free. Moreover, the violent behaviour of customers and communities sometimes forced technical

teams to leave without cutting off, e.g. as a manager of NEDCo suffered in Bawku.<sup>91</sup> Thus, a sizeable number of customers accumulated arrears without proper counter-measures being taken. Secondly, meter reading was not carried out systematically. In villages, but also in towns, an appreciable number of households never saw a meter reader for months, if not years. These households were accordingly given bills calculated in line with an estimated flat rate, usually below actual consumption. Thirdly, some large customers, and public entities such as military barracks, schools and governmental offices, incurred in large arrears. NED was pervaded by a sense of powerlessness. The abovementioned difficulties were not unique of rural areas, though. Well-off residential customers in urban areas also evaded payment, singularly those who enjoyed amenities such as air conditioning or freezers. For many, the fraud performed by the well-off presented the real challenge. Fraudsters had a range of strategies at hand: they could pay only a share of the bill given to them; or they could bribe a bill collector (in collusion with someone in the central office) with 20 cedis in exchange of the settling of a bill of 100 cedis. Non-technical losses due to poor revenue collection combined with transmission and distribution losses caused by deficient infrastructure and operation (see figure 46).

**Figure 46: Breakdown of quasi-fiscal losses in electric distribution companies.**

|                                   |                     |
|-----------------------------------|---------------------|
| Technical Losses                  | Transmission Losses |
|                                   | Distribution Losses |
| Non-Technical (Commercial) Losses | Billing Losses      |
|                                   | Collection Losses   |

**Source: Own elaboration.**

Against this backdrop of inadequate mechanisms of revenue collection, prepaid meters emerged as a game changer. Throughout the 2000s, and all over Africa, distribution companies opted to force users to pay for their electricity supply in advance of delivery. Soon, this technology became the main avenue to improve revenue collection and, ultimately, ameliorate the balances of distribution utilities. Thus in the late 1990s Eskom calculated that for rural electrification switching to a prepaid system would significantly shed the costs of

<sup>91</sup> The incident was triggered by a campaign undertaken by NEDCo staff to quell meter tampering in Bawku (EU Governance Unit Officer 2013).

billing, reading meters and repairing them, decrease the incidence of pilfering through meter tampering, and reduce the risk of its staff in visiting people at odd hours (Tewari and Shah 2003). The World Bank also saw the advantages of prepaid meters very clearly:

The prepaid technology enhances utility revenue and reduces costs in multiple ways: (i) accelerate cash flow; improves the utility's financial position; (ii) reduces pilferage; (iii) reduces bad debts; (iv) reduces administration costs (no meter reading & billing; previous balances recovered; revenue shortfalls eliminated; disconnect/re-connect costs reduction); (v) supports loss reduction programs; (vi) increases Client's satisfaction and confidence (World Bank 2007b, 49).

In deploying prepaid meters, however, electric distribution utilities operating in the peripheries unintentionally unleashed fresh tensions with the political calculations behind electrification that the previous chapters have unveiled. By deploying prepaid meters, utilities introduced a technology intrinsically biased toward lessening the unevenness in electrification patterns between regions. Progressively cajoling more users into a straitjacket of rigid mechanisms of payment, prepaid meters standardized the mechanisms of delivery of electricity to an increased number of users, although this did not necessarily translate into more homogeneous behavioural patterns amongst customers (Baptista 2015; R. H. Ghanadan 2008; Ruiters 2011; von Schnitzler 2008; Telles Esteves et al. 2016; Tewari and Shah 2003). In particular, rural dwellers who had been prone to resort to informal mechanisms to accumulate arrears, given the costs of enforcing disconnections in distant communities, were stripped of such 'informal subsidies', and forced to buy units in advance like urban dwellers. In this way, the patterns of use of electricity became more even within and between regions, as they increasingly responded to a commercial rational. This commercial rationale underpinning the deployment of prepaid meters, however, clashed with other logics of electricity provision. Thereby in northern Ghana, the commercial logic clashed with a reality of poor endowments, massive lifeline customers and, most crucially, with an organization setup (ie a sub-national utility) premised upon the assumption that economic losses in the North were not as serious a problem as in the South.

The discussion above speaks to the research question that guides this work: how African states govern their peripheries. More specifically, the discussion points to how tensions in the regions between the deployment of prepaid meters and the practices facilitated by

existing organizational setups emerge as one potential mechanism militating against core-periphery linkages orchestrated in the capitals. But the discussion also hints to a deficiency already signalled in the theoretical chapter. Boone's model of 'unevenness by design' (Boone 2012), however appropriate and useful, tends to overlook the agency of sub-national state agents in reproducing (or quelling) geographical irregularities in state reach.

Accordingly, this chapter wishes to explore the variation in the tensions between prepaid meters and the organizational designs in northern Ghana, and their relative absence in southeastern Tanzania. To do so the chapter draws upon a comparative logic based on the difference in organizational setups and endowments between both case studies, and the similitude in geographical and demographic factors. The chapter aims to bring into sharp relief the relevance of the logics underpinning extant organizational setups. Such logics can characteristically be represented as 'welfare' vs. 'commercial' provision and are prototypically represented by northern Ghana and southeastern Tanzania, respectively.

The chapter is structured as follows. The first section explores the tension between the potentially homogenizing effect of prepaid metering and logics underpinning the organizational setups for provision in the peripheries. The exploration combines a literature review with insights obtained from NEDCO and TANESCO staff through interviews. Also, and in search of potential sources of tension between prepaid metering and organizational setups, this section interrogates the assumptions that underlie the different organizational designs of distribution utilities in northern Ghana and southeastern Tanzania. Drawing upon documentary evidence and interviews to staff in NEDCo and TANESCO, this section shows that each organizational setup correlates with one organizational goal: delivering welfare in northern Ghana, operating commercially in southeastern Tanzania. The second section performs an empirical analysis of how far NEDCo and TANESCO went in deploying prepaid meters in Upper East and Mtwara, respectively. The chapter concludes by discussing how exploring the tensions between organizational setups and the deployment of prepaid meters or, more generally, between the operational strategies of utilities in search of protecting their revenue, and the institutional designs set in the centre, may contribute to a richer understanding of the mechanisms that contribute to the (re)production of singular patterns of electrification in peripheral regions of African countries.

### **6.1. Administrative choice in the provision of electricity to the peripheries**

Before concluding this chapter, something needs to be said about the organizational setups that undergirded the territorial strategies of access and provision. So far, this chapter and the previous ones have mentioned this issue only irregularly. This section sets out to provide a more specific exploration of the subject.

Thus, for instance, the creation of the NED under VRA had its origins in the belief in Ghanaian governmental and donor circles that VRA offered better prospects of success, but also guaranteed the reimbursement of the loans incurred in the initial stages of the NES (Former NED Commercial Manager 2013; NEDCo Head of Public Affairs and Community Relations 2013). This is how a World Bank report expressed such confidence a few years later, after the completion of the project that had extended the grid to the North:

A salient characteristic of the project was that it was designed with concern for an efficient implementation. VRA was appointed the owner of the facilities and the manager of the project precisely because it had the resources to do it successfully. This concept was understood and agreed to by all parties including ECG which had no difficulty in relinquishing the northern regions to be supplied by VRA (World Bank 1993a, 4).

NED was entrusted with the distribution of electricity, but access to electricity, channelled through the NES, was assigned to a unit within the MoE. Under this organizational arrangement, access and provision saw their roles clearly separated, at least in principle. NED obtained electricity from VRA to distribute it to customers in the north; the Ministry was responsible of establishing the regulatory framework for the provision of electricity, as well as of the conception and implementation of the access component materialized in the NES and the SHEP. Thereby, the MoE, in conjunction with the Presidency, retained the capacity of setting the geographical priorities in deploying the grid. In this regard Ghana opted for a model of utility-led electrification, in contrast with other African countries which established rural electrification agencies (Massé 2010). The MoE also controlled the policy dialogue with international donors, notably with the World Bank. Despite so, VRA allegedly continued to benefit from privileged access to both the Presidency and the World Bank. In practical terms, the policymaking mandate of the MoE meant that it also enjoyed considerable discretion over technical aspects. The Ministry not only controlled the selection of contractors, but also

influenced to a considerable extent the equipment and devices present throughout the distribution grid. This occurred through the action of the contractors external to NED, even though the technical standards were those initially established by NED and subsequently by the Energy Commission. Originally, the Irish Electricity Board also played a prominent advisory role (World Bank 1987). For some in NEDCo, the external advice of consultants from the United States was the ultimate cause of the decision to establish the voltage for distribution in the northern demarcation at 34.5 kV, in contrast with the 33 kV prevalent in the area supplied by ECG. In this regard, the distribution utility, VRA/NED, had relatively little say in the technical configuration of the grid that it had subsequently to operate. This proved a source of recurrent hostility between NED and the Ministry, as the former accused the latter of relaxing the standards of construction in order to maximize the number of kilometres and connections (NEDCo 2013b).

After the establishment of NED, the organizational architecture remained unaltered for two decades. In the mid-2000s, however, the government allegedly pondered over the convenience of establishing separate structures for rural electrification, and accordingly created 'a Project Management Unit under the MOE, to be potentially upgraded into a Rural Electrification Agency with a separately administered Rural Electrification Fund' (VRA 2007, 6). This alternative was finally discarded. More tangibly, in 2006, transmission assets and operations were transferred from VRA to GRIDCo, a new publicly owned utility operating in the segment between generation and distribution.

The settlement between VRA/NED and the Ministry would start to change in the late 2000s, when the government decided that NED would be segregated from VRA and converted into a fully independent distribution utility, in equal terms with ECG, under the name of NEDCo. Even though the Strategic National Energy Plan of 2006 envisaged a merger between NED and ECG (EC 2006b), and the National Energy Policy of 2010 did not make any mention to a segregation of NED from VRA, the latter was the policy path finally chosen. This separation thus entered into force officially on May 8<sup>th</sup> 2012, but for some time NEDCo still remained under the supervision of VRA. Thus, for instance, both utilities shared software platforms and even bank accounts.

As mentioned above, the insertion of NED within VRA soon proved useful to hide off the losses of the former from the public attention. As NED continued to incorporate to its assets

new spurs of the grid built by external contractors and funded by the NES or, to a lesser extent, the SHEP; and every new batch of customers in distant rural areas further eroded the accounts of NED, annual losses in excess of US\$ 20 million were the norm from 2007 to 2011 (NEDCo 2013b). Despite such stubborn losses, NED's accounts remained largely unreported in the media. Even in the midst of the power crises that brought about the rationing of electricity in 1997-98, 2002-03, 2006-07 and 2012-14, Ghanaian media invariably concentrated their attention on ECG. One plausible reason may be that the bulk of electricity users in Ghana is supplied by ECG. Less reasonable however was the lack of attention to NED's losses in policy reports and scholarly research. Thus, for instance, the Strategic National Energy Plan of 2006 mentioned the need to address the poor management of ECG before its planned merger with NED, but did not suggest the same recommendation for the latter (EC 2006b). Similarly, the Energy Sector Strategy of 2010 set the goal of reducing commercial losses to 9%, but set ECG as the responsible agency for implementation. Equally, the "Power Sub-Sector Strategy Issue 3: Restoration of financial health of VRA and ECG" made no mention of NED at all (MoE 2010a). In this regard, the donor community adopted the same approach. Moreover, the project in support of Ghana's power sector in 2007 assigned ECG the entire distribution component, whereas NED, despite also being a distribution utility, only participated in the access component. Throughout the appraisal document, any reference to Ghana's utilities invariably involved VRA and ECG, and very rarely NED (World Bank 2007a).

The low-key profile of NED vis-à-vis ECG and VRA may also be attributed to the fact that for many years NED was broadly perceived as a welfare company, 'a social activity' and 'purely rural' (NEDCo Principal Marketing Officer 2013), or, as portrayed by politicians campaigning in the region, a 'social service' (NEDCo Planning Engineer 2013). Notions amidst citizens in the north that electricity is part of the social contract with the state (VRA Director of Business Planning and Development 2013), or that 'if I don't have electricity, I am not a Ghanaian' (Former NED Commercial Manager 2013) cast a long shadow upon how NED was perceived locally but also nationally. Indeed, for some, NED 'was set up more or less to develop the north', as a reaction to the deeply entrenched reproduction of underdevelopment that the colonial era instilled upon the North, deemed as a source of manual labour for the mines in the south (Former NED Commercial Manager 2013).



In the eyes of NEDCo staff, the fact that NED was perceived as a parastatal with social aims and not a full-fledged commercial utility was closely connected to the political strategy of maximizing access regardless of costs. This strategy put a heavy burden upon NED's shoulders, given that the government did not make any financial provision for the subsequent delivery of electricity to the communities that it connects under the access programme (NEDCo Principal Marketing Officer 2013). Connecting a single rural household was estimated to cost at least US\$ 3,000 dollars, compared to US\$ 200 in urban settings. Overall, the strategy was thought to have ceased to make sense, if it ever did (Former NED Commercial Manager 2013).

By contrast, in southeastern Tanzania TANESCO was perceived in similar terms to its image in the rest of the country. If anything, its projection in the media was framed as part of an industrialization drive, at a time (the late 2000s and early 2010s) when the goal of energy policies nationwide was formulated as increasing per capita consumption and access (GoT 2013). This discursive framework also prevailed in the media. The staff of TANESCO in Mtwara deemed their ultimate mission as primarily developmental. But this perception was subsumed into the widely-held assumption that the utility had to be run 'properly', that is, in keeping with commercial and technical criteria (MEM Tanzania Assistant Commissioner Energy Development 2014). This notion was also closely associated to an overall policy of operating electricity provision in Mtwara in anticipation of upcoming financial sustainability. Financial sustainability and maximizing new connections were in this sense perceived as synergic. Maximizing new connections was therefore not a burden, but an asset for TANESCO (TANESCO Mtwara Regional Engineer 2014; TANESCO Mtwara Regional Manager 2014; TANESCO South Zonal Manager 2014). After the riots of 2013, the goal of maximizing connections entertained by TANESCO also aligned with the governmental policy of addressing the grievances violently expressed by local via increasing access to electricity. The electrification of the southeastern Tanzania was deemed as a major pre-requisite for industrialization, the latter being the cornerstone of any development in the region (Mtwara District Head of Planning 2014; Mtwara Municipality Acting Municipal Director 2014; Mtwara Regional Administrative Secretary 2014; Mtwara Regional Commissioner 2014).

Nationwide, Tanzania also witnessed a different division of labour for rural electrification than that prevalent in Ghana. In Tanzania, 2005 brought the establishment of REA, mandated with bringing the benefits of electricity to rural areas. This took the planning and

implementation of rural electrification projects away from the MEM and TANESCO. Nonetheless, this did not impede REA to still employ TANESCO as principal implementation partner for its projects, once the former started to operate in earnest in the late 2009s. The delays incurred in procurement by TANESCO led REA to resort to contractors for the implementation of the projects, thereby reducing the involvement of TANESCO in rural electrification (TANESCO Manager Electrification 2014).<sup>92</sup>

To sum up, the role of the organizational setups in the territorial strategies of access and provision across northern Ghana and southeastern Tanzania differed in at least one key point. In Mtwara and Lindi, the availability of gas afforded the possibility of an organizational fix premised on a private utility. The availability of a cheap resource for power generation suddenly put the region in the avant-garde of sectoral policies in the country, and made possible the optimal solution for the economic and managerial ideology *en vogue*. By contrast, in northern Ghana the paucity of endowments required another organizational setup to guarantee the political sustainability of the exceedingly financially unsustainable electrification spree. Intentional or not, the organization setup contributed to the territorial strategy of access, and made possible the prolongation of a territorial strategy of provision that ran contrary to a national electricity regime veering towards full-cost recovery and the quelling of subsidies except for the very poor. To the same end contributed the extended notion that NED operated in the region above all to deliver a welfare benefit rather than a commodity. Thereby, the organizational setup synergized and reinforced the singularity of the programme of electrification in the north of Ghana, until the Ghana Power Compact of the early 2010s re-inserted NEDCo to the core of the national electricity regime. That was less the case with southeastern Tanzania. In the latter, the organizational setup before and after the policy turn of 2012-13 always remained aligned with the dominant course of Tanzania's national electricity regime.

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<sup>92</sup> A former Permanent Secretary of the MEM described the approach of putting both TANESCO and REA to work together as making 'both commercial' (2014).

## 6.2. Prepaid meters and distributional settlements

Prepaid meters intrinsically tend to undercut the differences in behaviour between users of electricity. This is set to happen within regions, but also between regions. The effect is also likely to be felt more intensely in regional peripheries. In peripheries, informal conduits to circumvent payments were common before the deployment of prepaid meters in rural areas and low-income households. As a result, the homogenizing effects of prepaid meters are likely to be more transformative in peripheral regions. Regrettably, the burgeoning literature on prepaid meters has given little or no attention so far to how they may foster or, contrarily, thwart unevenness in patterns of electricity supply between regions. Instead, the literature has focused on understanding and estimating the consequences of deploying prepaid meters as a technical fix to persistent losses. The literature has nonetheless emphasized how prepaid meters instil more homogeneous behavioural patterns amidst customers (Baptista 2015; R. H. Ghanadan 2008; Ruiters 2011; von Schnitzler 2008; Telles Esteves et al. 2016; Tewari and Shah 2003). Yet as the Energy Commission of Ghana acknowledged in its Strategic National Energy Plan of 2006, 'credit meters apparently allow individual customers to delay bill payment and some eventually never to be paid due to debtors relocating or absconding' (EC 2006a, 23). In Ghana, for instance, a prevailing informal settlement until the 2000s was that a sizeable share of new, distant (mostly rural) customers remained unmetered, or billed in keeping with a flat rate. This phenomenon attained singular saliency amidst rural customers, who satisfied their outstanding bills in 'instalments' agreed with the utility. *De facto*, this and cognate practices amounted to an informal subsidy originating in the state and non-subsidized customers and benefitting poor (and not so poor) households. Such informal subsidy supplemented the formal cross-subsidy embedded in the lifeline tariff. In deploying prepaid meters, though, peripheral utilities have rendered access to informal subsidies more difficult. For those in distant settlements for whom deploying cash collectors was uneconomic, the informal settlement was even more propitious. They were allowed to accumulate arrears for substantial periods of time, and pay them in instalments (on the other hand, this invited the Damocles' sword of a sudden disconnection). Even today, dwellers in remote rural communities know all too well that the distribution company incurs considerable expenditure when it sends its cash collectors to settle a handful of modest bills and gather the payments. Also, they know that if the company is forced to execute a disconnection, it incurs in significant costs when it dispatches teams of technicians to remote

areas. Consequently, such dwellers are well positioned firstly to accumulate limited arrears, and secondly to negotiate and postpone payments. Similarly, customers of the utility, both in urban and rural areas, may pay a bribe to a cash collector for a reading below actual consumption (Former NED Commercial Manager 2013; NEDCo Principal Marketing Officer 2013; TANESCO Mtwara Regional Engineer 2014). Such mechanisms amount to a subsidy *de facto* from those who pay their bills to those who do not pay and, ultimately, also to a subsidy from the state to users in arrears, if the state periodically writes off the red numbers of the electric company. The informal subsidy to defaulters supplements the formal cross-subsidy from the state to low-income users embedded in the lifeline tariff. It is important to bear in mind that customers in arrears are not necessarily those falling within the low-income brackets. As it is well known, well-off customers are one of the biggest fraudsters to electric utilities in Africa (Kojima and Trimble 2016). With the advent of prepaid meters, working capital, ie current assets minus current liabilities, is no longer financed by the utility (as with credit meters), but by customers instead; accounts receivables, ie electricity units billed and set for payment within an agreed time frame, are minimized; the incidence of billing errors is considerably diminished; past arrears incurred in the credit system can be recovered through a fee payable in each recharge (in northern Ghana, no more than a 10%); physical opposition to disconnections and, therefore, violence against utility staff is abated; and, lastly, customers have 'no alternative but to be within their consumption' (NEDCo Principal Marketing Officer 2013), which fends off new debts. Or, in the words of one NEDCo senior staff, 'you have cut yourself off' (NEDCo Principal Marketing Officer 2013). Customer education thus goes a long way to ensure that prepaid metering technologies are patronized without serious friction. For NEDCO staff, customer sensitization guarantees that electricity is used more conveniently (for the company. Moreover, one set of paramount benefits concerns internal operational arrangements in the utilities. In the past, an extensive dose of trust had to be put on meter readers and cash collectors. Collusion between them and customers was hard to police, particularly in distant rural areas. As a result, cash collectors regularly dispatched to rural towns had to be rotated each month (NEDCo Upper East Acting Area Commercial Officer 2013). The problem was even more acute with meter readers. They occupied a privileged position which allowed some to strike out informal agreements with customers and under-report in exchange for a share of the discount. Hence, meter readers had to be hired very carefully. They could only be picked amongst those members of the

community with a reputation for honesty, with the agreement of local chiefs. With prepaid meters, both meter readers and cash collectors were made redundant. The latter were transferred to the offices of NEDCo, thus considerably facilitating direct supervision. Also, prepaid meters avoid the problem of 'lazy readers' (Former NED Commercial Manager 2013). Indolent or time-pressed meter readers can note down readings without actually visiting the customer's premises. After some consecutive months of inaccurate and often underestimated readings, the customer receives a bill unexpectedly high. This bill thus reflects the actual consumption of several months, but accumulated in a single payment. All in all, the whole mechanism leaves many holes and key decisions in the hands of persons beyond NEDCo's purview. This caused many protests from customers and muddled relations with the utility.

However, not all is positive about the introduction of prepaid meters. Their homogenizing effect may lead to tensions with extant organizational setups if the latter respond to logics that differ from the commercial rationale that underpins prepaid metering. Organizational designs may respond to various motivation: replicating the organizational forms of leading organizations in their field (DiMaggio and Powell 1983), seeking legitimacy (Deephouse and Suchman 2008) or projecting political strategies (Boone 2003b, 2003a) are only a few of them. In the case of peripheral electrification in Northern Ghana, the organizational setup that resulted in the creation of a distribution utility with a sub-national mandate within a generation utility was closely associated to the growing realization that the structure originally conceived could also serve as a conduit to fund access whilst at the same time hiding off the losses from the general public and, to a lesser extent, from donors.

To continue with the empirical analysis in this chapter, there remains to be seen the actual extent which reached the tensions between deploying prepaid meters and the rationales underpinning the organizational setups in northern Ghana and southeastern Tanzania. To that end, the next sections infer such tensions from the reach of the deployment of prepaid meters in both regions.

### 6.3. Deploying prepaid meters at a different pace

By 2013, prepaid meters had been installed across 64% of Tanzanian households and commercial customers; as a result, two years later TANESCO was on course to achieving its target of 100% prepaid meters set for the end of 2016 (AfDB 2016). In 2015 alone, NEDCo received 90,000 prepaid meters for installation (NEDCo 2016). Despite the former, prepaid metering has hardly solved the strains of African distribution companies in general, let alone those of the units operating in sub-national peripheries. Thus, TANESCO, on average, only collects US\$ 0.14 per kWh billed, against a cost of supply of US\$ 0.17; in Ghana, the same figures for ECG stand at US\$ 0.108 and 0.14, respectively (Trimble et al. 2016). In northern Ghana, billed and flat rate customers represented in 2011 GHS 125 million out of a total of GHS 729 million (NEDCo 2013c). Average figures, however, largely capture the costs of supplying urban areas, which remain characteristically lower than their rural equivalents. This section narrates the introduction of prepaid meters in northern Ghana and southeastern Tanzania. It also offers an empirical contrast of the extent of the deployment of prepaid meters in both regions.

Prepaid meters have a trajectory of two decades in northern Ghana. They were first tested in this region in the late 1990s, as part of a pilot project that saw them installed in three towns, namely Tamale, Sunyani and Bolgatanga. This project progressed in parallel to analogue tests by ECG, which had pioneered prepaid metering technologies in Ghana in 1994.<sup>93</sup> NED thus invested about US\$ 300,000 toward the deployment of 5,900 first-generation meters equipped with smart cards. To that end engineering and commercial staff had to overcome the reluctance of the Managing Director, who failed to see the advantages of the more costly prepaid meters (Former NED Commercial Manager 2013).<sup>94</sup> Arguments about the need to sensitize customers about the need to accommodate consumption and affordability finally prevailed. No less important was the urge to find novel fixes to skyrocketing non-technical losses. By then, non-technical losses in the northern demarcation probably hit 20%, according to an estimate based on the earliest data available on combined technical and commercial losses in the year 2000 (EC 2014). Therefore, novel fixes were badly needed. Conventional solutions such as cut-offs hardly incentivized customers to pay their

<sup>93</sup> See <http://www.ecgonline.info/index.php/types-of-meters.html> (accessed May 14, 2017).

<sup>94</sup> See also <http://www.mclglobal.com/History/Jan2000/06a2000/06a0n.html> (accessed June 12, 2017).

bills in due time. If anything, cut-offs only contributed to dwarf the customer base. Prepaid meters were accordingly introduced with the explicit aim of incorporating innovative technical breakthroughs that could streamline commercial practices. Modern commercial practices in Ghana, also in Tanzania, drew inspiration from the prepaid experiment in South Africa of the 1990s (Tewari and Shah 2003). The underlying rationale rested upon instilling a more calculative behaviour amidst users of electricity. The first model, however, suffered from built-in deficiencies that caused impromptu blackouts. Also, not all customers received sufficient information in advance about the traits of the prepayment system. Consequently, a fraction of users met the first prepaid meters with reluctance if not animosity. All in all, however, NED judged the experiment an overall success, since an internal survey revealed that 90% of the customers expressed satisfaction with the new system. NED was thus also satisfied, even though consumption per household contracted, to remain in most cases beneath the 50 kWh per month marking the upper threshold of the lifeline tariff. Cash flows, by contrast, improved, reassuring NED about the returns of the experiment. To the success of the pilot project also contributed a massive campaign of distribution of compact fluorescent lamps carried out by NED in the early 2000s. Subsidized compact fluorescent lamps aided customers, especially those who used electricity principally for lighting, to reduce their bills sensibly. The success of this first initiative encouraged NED to mainstream prepaid meters throughout the 2000s. To that end, 'first rate customers' were prioritized (VRA 2005). In 2003, a second batch of prepaid meters were rolled out in Tamale and Sunyani. This time, prepaid meters were procured from a different supplier with an aim to contrast the capacities of different models and contractors. The second model also had its constitutive limitations, such as the absence of any feature to pre-empt pilfering. However, the project was also deemed a success, even though 2003 precisely marked the peak of technical and commercial losses, hitting 33.6% (EC 2014). Indeed, losses continued unbridled throughout the 2000s, and in 2011 they represented 28% of sales of electricity, or approximately US\$ 21 million (NEDCo 2013b).<sup>95</sup> To address such mammoth losses, as the 2010s drew closer NED stepped up its efforts to mainstream prepaid meters. By 2010, NED had installed an additional round of prepaid meters with the financial assistance of the World Bank's Ghana Energy Development and Access Project (VRA 2011; World Bank 2007a). Most efforts,

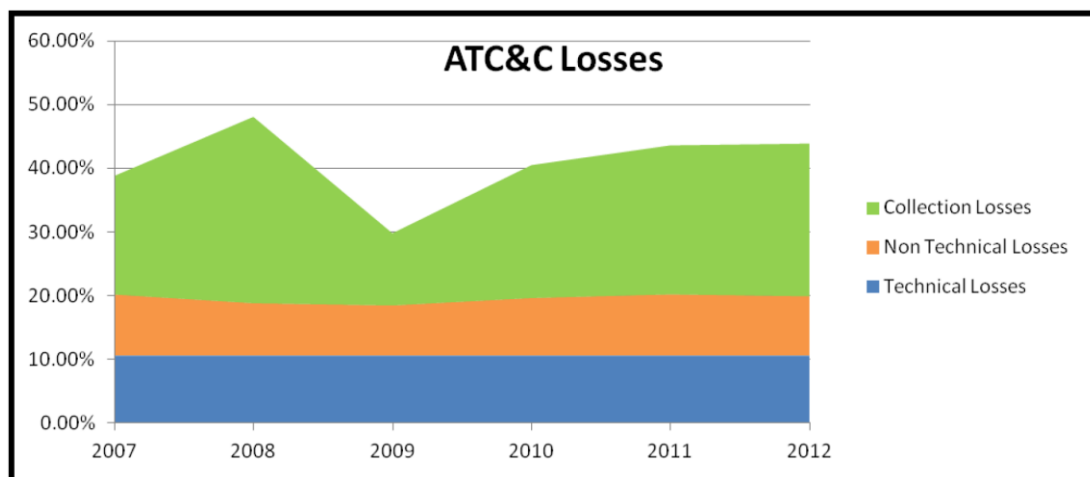
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<sup>95</sup> According to Energy Commission statistics, also retrieved from NED, in 2011 combined technical and commercial losses amounted to 19.2% instead (EC 2014).

however, concentrated in urban and peri-urban areas. That was also the case with the Hexing HXE112-SP, a smart card-operated model that became the third and currently the last prepayment device added to the network, and the split type, for distant reading from outside household premises. In 2013, NEDCo marketed its fancy Hexing HXE112-SP prepaid meter model with these words: 'You decide the amount of money you want to spend on electricity at any given time; No more bills; No more disconnection; You will not owe NEDCo anymore' (NEDCo 2013a). In the ten years or so of prepaid deployment, they helped attenuate the massive losses of the mid-2000s. By 2011 losses had substantially declined, if not in absolute numbers at least in terms relative to sales of electricity. However, commercial losses of 9.6%, technical losses of 10.6%, and above all, a dismal collection rate of 76.59% marred NED's accounts.

The impact of prepaid metering in northern Ghana and Tanzania has been uneven. In the NEDCo demarcation, prepaid metering seems to have failed to make a difference (see table 27 below). Thus, non-technical losses have remained barely unchanged, amounting to 10% of energy sold, in the period from 2007 to 2012 (see figure 47).

**Figure 47: Technical and commercial losses (%), NEDCo, 2007-2012.**



Source: AF-MERCADOS EMI (2014, 80).



**Table 27: Revenue collection figures for NED, 2007-11.**

|  | 2007     | 2008     | 2009     | 2010     | 2011     |
|--|----------|----------|----------|----------|----------|
| Energy Purchased (GWh)                       | 494      | 529      | 566      | 643.82   | 728.57   |
| Energy Sales (GWh)                           | 365      | 392      | 404      | 517.74   | 581.11   |
| Distribution losses (%)                      | 26.11    | 25.9     | 28.62    | 19.58    | 20.24    |
| Energy Billed (GHS '000)                     | 36.72    | 59.75    | 64.33    | 97.01    | 125.53   |
| Revenue Collected (GHS '000)                 | 29.88    | 42.25    | 57.02    | 76.75    | 96.15    |
| Collection Rate (%)                          | 81.36    | 70.72    | 88.65    | 79.12    | 76.59    |
| Combined technical and commercial losses (%) | 39.87    | 47.6     | 36.73    | 36.38    | 38.91    |
| Profit/(Loss) (GHS '000)                     | (25,346) | (31,346) | (34,022) | (39,430) | (35,355) |
| Profit/(Loss) (US\$ million)                 | (25.7)   | (24.5)   | (24.0)   | (26.5)   | (21.6)   |

**Source: Reproduced from NEDCo (2013b). Exchange rates retrieved from <http://xe.com> (accessed June 14, 2017).**

According to NEDCo, the root cause for its poor performance lay in the low technical standards and the sustained under-investment in the network:

Because of the low customer density and the absence of large industrial customers, the design standards of the network were relaxed in order to make the extension economically feasible. The design was to allow for the ultimate utilization of some components of the networks by 1995. Despite this, no substantial investment has been made in the network over the past 25 years except the US\$10m GEDAP assistance (NEDCo 2013b, n.p.).

However, by the first quarter of 2013 NEDCo had barely delivered 100,000 meters to a customer population almost reaching 450,000.<sup>96</sup> In 2011 flat rate, ie non-metered, customers still continued to be connected under credit meters (VRA 2012). The considerable proportion of unmetered and credit customers cast a long shadow over NED's losses. Moreover, prepaid meters had spread across districts unevenly, to the extent that they were operative mostly in urban areas: the four regional capitals operated by NED, ie Tamale, Sunyani, Bolgatanga, and Wa, and a limited number of towns chosen amongst the bigger district capitals, e.g. Wenchi, Berekum and Bawku. In rural areas, its penetration was remained generally limited, and spatially even more unequal. In response, NEDCo envisaged to install 200,000

<sup>96</sup> Source: unpublished data from NEDCo, obtained from the Commercial/Marketing department.

prepayment devices in the 2013-17 period, as part of a business plan also comprising the delivery of Automatic Meter Reading (AMR) meters for large consumers (NEDCo 2013b). The approach was endorsed financially by the northern component in the assistance to Ghana of the Millennium Challenge Corporation (MCC 2014). Similar plans had started to elicit some resistance in the past. Thus for instance the 2012 campaign to roll out prepaid meters was met with more than bitterness. Customers became unhappy with the meters, as they alleged that they 'ran faster' than its credit equivalents. With dissatisfaction growing, and spurred by the relatively unknown Progressive Citizens Association of Tamale, customers and youth groups took to the streets in this town in September 2012. A similar demonstration occurred one month later. The issue became extremely sensitive in the months prior to the presidential and legislative elections of December 2012. NEDCo thus attributed the episode to opposition parties seeking electoral returns. The government ultimately sought a temporary compromise and ordered NEDCo to suspend the deployment of prepaid meters and seek wider consultation and sensitization (NEDCo Head of Public Affairs and Community Relations 2013).<sup>97</sup> Similarly, NEDCo carried out recurrent campaigns against pilfering with remarkable echo in the media: 426 'power thieves' were arrested in July 2014; and 45 taken to court in May 2016. Cables were sometimes tampered in connivance with NEDCo workers.<sup>98</sup> In addition, the power shortages of 2015 provoked in June an assault to the main commercial office in the business district of Tamale by a group of 100 youngsters.<sup>99</sup> This was all the more remarkable in a region relatively spared of load shedding due to its comparatively modest load of 100-150 MW (Former NED Commercial Manager 2013; NEDCo Head of Public Affairs and Community Relations 2013; NEDCo Principal Marketing Officer 2013). Episodes of protest triggered by revenue protection measures reflected an enduring contradiction between the expectations of customers and NEDCo staff, that two decades of provision, including the deployment of prepaid meters, had failed to alter. Users of electricity

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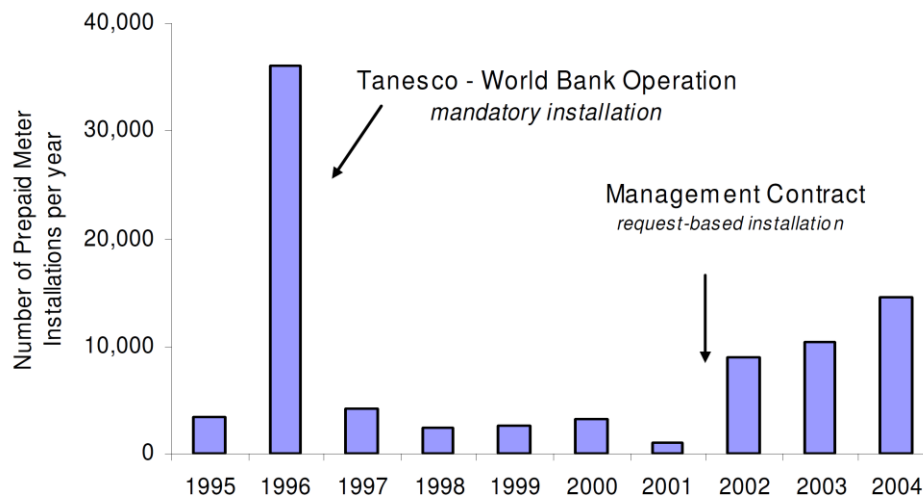
<sup>97</sup> See <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/Tamale-residents-embark-on-demo-over-new-meter-installations-250376>; also <https://www.newsghana.com.gh/government-halts-tamale-prepaid-meters-installation/> (accessed May 25, 2017).

<sup>98</sup> See <http://citifmonline.com/2016/05/13/nedco-prosecutes-45-power-thieves/> (accessed May 13, 2017); <http://citifmonline.com/2014/07/30/nedco-arrest-426-power-thieves/> (accessed May 13, 2017).

<sup>99</sup> See <http://citifmonline.com/2015/06/23/security-boosted-at-vranedco-tamale-offices/> (accessed May 13, 2017).

continued to perceive power ‘as a government service, as free, and we are expected to operate as commercial entities’ (Former NED Commercial Manager 2013).

**Figure 48: Number of prepaid meters installed by TANESCO in Tanzania, 1995-2004.**



**Source: Ghanadan (2008).**

Despite their early adoption in Dar es Salaam and other regions of Tanzania (see figure 48), prepaid meters did not arrive in earnest in Mtwara and Lindi until the early 2010s. Their rollout did not follow a trajectory different to the rest of the country, as was the case in northern Ghana. Being served by the same utility, prepaid deployment in Mtwara and Lindi abode by the national strategies of TANESCO. As prepaid meters are concerned, TANESCO was a frontrunner. In fact, Tanzania witnessed prepaid metering being introduced earlier than Ghana. “LUKU” meters, as they are often referred to, were adopted in the mid-1990s. In Swahili LUKU stands for *Lipa Umeme Kadiri Utumiavyo* (or ‘pay electricity according to what you use’). Throughout the late 1990s and 2000s, TANESCO introduced successive models of LUKU meters. They drew on different technologies, from smart cards to numerical tokens typed via keyboards and, lately, split meters and AMR for Large Power Users (TANESCO 2011a). NETGroup Solutions, the South African company that took over the management of TANESCO from 2002 to 2004, made of the deployment of prepaid meters a major tool towards improving performance (see figure below). Donors also threw their support as well as their purse behind prepaid devices. In 2007, the World Bank’s Tanzania

Energy Development and Access Project funded the deployment of 60,000 prepaid meters (World Bank 2007b). An aggressive campaign against energy theft conducted throughout 2012 to 2014 in urban areas, known as '*Kampuni Kamata Wezi wa Umeme*', or Campaign Against Electricity Thieves, unveiled discrepancies in 3% of the 161,877 customers inspected (TANESCO 2011b, 2014). As prepaid meters contributed to push revenue collection rates above 95% in the early 2010s (see table 28 below), TANESCO determined that by the end of 2016 all meters for lifeline (D1) and general use (T1) customers ought to be of the prepaid type (MEM 2014, 2015). By 2013, TANESCO had forced 64% of D1 and T1 customers into prepaid meters (AfDB 2015).

**Table 28: Revenue collection indicators of TANESCO, 2011-13.**

|                        | 2008     | 2009     | 2010 | 2011     | 2012      | 2013      | 2014          |
|------------------------|----------|----------|------|----------|-----------|-----------|---------------|
| Transmission losses %  | -        | -        | 5.3  | 6.1      | 6.1       | 6.2       | 6.0           |
| Distribution losses %  | -        | -        | 19.7 | 15.3     | 15.8      | 12.8      | 12.0          |
| Aggregated losses %    | 18.97    | -        | 25.0 | 21.4     | 21.9      | 19.0      | 18.0          |
| Collection rate %      | -        | -        | -    | -        | 93        | 97        | 97            |
| Profit/(Loss) (TZS m)  | (21,605) | (47,658) | -    | (43,349) | (177,399) | (467,704) | (26,298)<br>* |
| Profit/(Loss) (US\$ m) | (16.4)   | (35.6)   | -    | (27.5)   | (112.1)   | (295)     | (15.1)        |

**Source: TANESCO Financial Statements (2013a, 2014); MEM (2013); TANESCO Tariff Adjustment Applications (2013b, 2016a); Joint Energy Sector Review 2009 (MEM 2009). Exchange rates retrieved from <http://xe.com> (accessed June 14, 2017). \*Note: In 2014 TANESCO re-adjusted the end of its fiscal year to June 30<sup>th</sup>. For profit/loss results, 2014 also includes the first six months of 2015. Distribution losses include technical and commercial losses in distribution.**

The prevailing nationwide trends in Ghana and Tanzania in the deployment of prepaid meters also prevailed in their peripheries. Thus, in the four years between 2009 and 2012, the expansion of prepaid metering in northern Ghana did not keep pace with the increase in the customer base; by contrast, in the years between 2010 and 2013 the penetration of prepaid meters was substantial. This is the findings of the analysis below, that is confined to comparing Upper East and Mtwara. The choice of such regions enables a contrast between

comparable units. Regions in northern Ghana and southeastern Tanzania host considerable geographical and demographic disparities. Thereby, one key indicator influencing the cost-benefit ratio of deploying prepaid meters, ie population density, varies enormously from the 13 people per square kilometre of Lindi to ten times that figure in Upper East. Densities between Upper East (118 people/km<sup>2</sup>) and Mtwara (76 people/km<sup>2</sup>) are more comparable. An additional reason to choose these regions is that, as they have the highest densities amongst all, they also represent the most auspicious cost to benefit ratio as the deployment of new revenue collection technologies is concerned. Therefore, a low rate of deployment hints to the presence of factors beyond the purely commercial rationale.

Tables 27 and 29 below reveal that prepaid meters were rolled out in earnest in the latter since 2011/12, whereas NEDCo dragged its feet to do similarly in Upper East. This is all the more surprising considering that serious efforts to introduce prepaid meters had started at least as early as 2004 (VRA 2005). NEDCo could therefore hardly plead inexperience. In any case, NEDCo extensively failed to convert prepaid metering into the most extended system of payment amidst the lower echelons of the customer base. By contrast, in Mtwara TANESCO overturned in barely two years a solid lead of 8 to 1 in favour of credit meters to establish a ratio of 2 to 3 amidst low residential customers. In particular, 2014 witnessed a massive exercise of installation of 7,000 prepaid meters in households. The campaign to install prepayment meters throughout Mtwara did not kick off before 2014 only because of a national shortage in the procurement to TANESCO of such devices. According to partial data available until May of that year, 50% of them were installed in Mtwara capital and its rural communities, 25% in Masasi (and Nachingwea), and the balance in Newala and Tandahimba to equal parts. This effort to rollout prepayment indicates a strong will by TANESCO to introduce prepaid meters not only amidst new residential customers connected to the grid, but also amidst existing ones. Also, the slow pace of growth in prepaid metering amidst general customers (mostly relatively well-off and commerce) allows us to draw two tentative conclusions: first, that prepaid metering was disproportionately directed toward the poorest; and second, that in its inception TANESCO probably targeted communities situated afar from the regional capital, in an effort to minimize the costs of dispatching meter readers to distant rural areas.

**Table 29: Customers of NEDCo in Upper East under prepaid and credit systems.**

|           | Prepaid     |                 |            |        | Credit      |                 |            |        |
|-----------|-------------|-----------------|------------|--------|-------------|-----------------|------------|--------|
| Year      | Residential | Non Residential | Industrial | Total  | Residential | Non Residential | Industrial | Total  |
| 2011      | 8,133       | 2,391           | 0          | 10,524 | 32,557      | 8,909           | 10         | 41,476 |
| 2012      | 9,925       | 2,996           | 0          | 12,921 | 36,665      | 10,034          | 10         | 46,709 |
| July 2013 | 13,671      | 3,796           | 0          | 17,467 | 37,024      | 10,560          | 7          | 47,591 |

**Source: Unpublished data from NEDCo.**

**Table 30: Customers of TANESCO in Mtwara under prepaid and credit systems.**

|      | Prepaid         |         |            |        | Credit          |         |            |        |
|------|-----------------|---------|------------|--------|-----------------|---------|------------|--------|
| Year | Low Residential | General | Industrial | Total  | Low Residential | General | Industrial | Total  |
| 2012 | 1,396           | 0       | 0          | 1,396  | 9,634           | 1,759   | 27         | 11,420 |
| 2013 | 4,670           | 0       | 0          | 4,670  | 9,311           | 1,646   | 39         | 10,996 |
| 2014 | 11,712          | 789     | 0          | 12,501 | 7,934           | 1,530   | 41         | 9,505  |

**Source: Unpublished data from TANESCO.**

The analysis also reveals that collection rates improved in Mtwara whereas they remained unchanged across NEDCo's demarcation (see tables 30 and 31). This outcome must be necessarily connected to the substitution of postpaid by prepaid meters. As the latter entail a collection rate of 100%, one mechanism to make this indicator grow is by progressively substituting postpaid by prepaid meters. Another mechanism to increase the collection rate which only affects postpaid meters is the increase in the ratio of urban users. As collection rates are higher in urban areas, a higher share of urban customers in the overall customer population tends to increase collection rates. Lack of specific data about the evolution of urban and rural customers renders impractical to settle which mechanism may have prevailed. In any case, the table 31 below illustrates the improvement of collection rates in Mtwara. Collection rates in Mtwara rose from about 70% to about 78% in barely two years. By contrast, in the NEDCo demarcation collection rates receded to 77%.

**Table 31: Collection rates (%) by NEDCo and TANESCO in Mtwara.**

|  | 2005 | 2006 | 2007 | 2008 | 2009  | 2010 | 2011 | 2012 | 2013 | 2014 |
|--|------|------|------|------|-------|------|------|------|------|------|
| NEDCo                                  | 77   | 103  | 81   | 71   | 89    | 79   | 77   | 77   |      |      |
| TANESCO<br>Mtwara<br>postpaid          | N/A  | N/A  | N/A  | N/A  | 101.4 | N/A  | 71.9 | 66   | 74.9 | 63.7 |
| TANESCO<br>Mtwara<br>post &<br>prepaid | N/A  | N/A  | N/A  | N/A  | 101.4 | N/A  | 71.9 | 67.2 | 79.9 | 77   |

**Source: VRA Annual Reports 2009, 2010, 2011 and 2012, and unpublished data from TANESCO.**

Partial data available along the first seven months of 2013 (see table 32 below) confirms a pattern of sluggish introduction of prepaid meters in the north of Ghana. Thereby, revenue collection rates not only failed to improve across all the regional demarcations of NEDCo. The rate indeed dropped to a disturbing 45% in the Northern region. To a certain extent, this drop had nothing to do with the slow introduction of prepaid meters, as it largely resulted from arrears of about GHS one million (US\$ 483,680) by one or several of the six industrial customers supplied in medium voltage. Indeed, in northern Ghana by end of 2011 the collection rate for Ministries and Departments and Agencies was 77%, and 85% without them (MCA 2012). However, a closer look at the figures, disaggregated per districts/stations, reveals the presence dismal collection rates across several rural areas of the Northern region, notably districts such as Gushiegu, Sabeba, Yendi and Daboya. Therefore, poor revenue collection in the Northern region in early 2013 was not only a consequence of the failure to collect arrears from large customers. More generally, in the Upper East, Northern and Upper West regions, lower collection rates were disproportionately a result of the failure to collect bills from commercial customers and governmental agencies. For instance, collection rates also stood remarkably low in Upper East, with a 69% regional average. In this case, the pattern of low collection was homogeneous across rural and urban districts in Upper East. In the three worst performing districts, namely Chiana, Zebilla and Navrongo, collection rates did not lag far behind the rest of the region. In the most unfavourable case, the figure stood only 8 points below the 69% regional average. Conversely, the same was true for the best

performing district in Upper East, Bunkpurugu (followed by Sandema and Bolgatanga).<sup>100</sup> Surprisingly, low collection rates were not the norm in Brong Ahafo and Upper West, where collection rates stood well above 80%. In particular, the contrast between Upper West and Upper East was telling, since owing to a strictly technical logic, collection rates ought to be higher in the latter than in the former. As Upper East is more compact in terms of population density, and revenue collection is not hindered by long distances, as is the case in Upper West, collection rates in the latter ought to be lower. However, the contrary was the case, cogently hinting to operational logics embracing factors other than purely commercial.

**Table 32: Collection rates per demarcation by NEDCo, January-July 2013.**

| Demarcation | Collection rate |
|-------------|-----------------|
| Sunyani     | 84%             |
| Techiman    | 88%             |
| Northern    | 45%             |
| Upper East  | 69%             |
| Upper West  | 86%             |
| TOTAL       | 70%             |

**Source: Unpublished data from NEDCo.**

In the case of Mtwara, it would be too adventurous to attribute the growth in revenue collection to the deployment of prepaid meters. First, the deployment was, even though growing in intensity, still very modest. And second, it coincided with a considerable growth in industrial users, which provide the bulk of income for the utility. The growth in industrial income already registered in Mtwara before the introduction of prepaid meters continued after their deployment. Thus, the highest rates of growth in the number customers in Mtwara were by far recorded amongst industries. Although disaggregated data between the three categories of customers is unavailable, it is reasonable to assume that the sharp increase in overall revenue in Mtwara in the four years under analysis stemmed from industrial growth.

Indeed, the analysis also reveals that prepaid meters were deployed over northern Ghana and southeastern Tanzania in very different operational conditions. For a start, the customer base of the utilities was considerably dissimilar. Absolute (tables 31 and 32) and relative

<sup>100</sup> The figures for the districts/stations have been obtained from unpublished data facilitated by NEDCo. They are not presented here for reasons of space.



(tables 33 and 34) figures for the customer base in Upper East (2009-12) and Mtwara (2010-13) are compiled below.<sup>101</sup> Even though in both regions households prevailed over other type of customers; and even though the number of households increased at remarkable rates in both regions, in Upper East residential outnumbered commercial customers by a ratio of approximately 3.5; by contrast, in Mtwara the same ratio stayed in the range of 6.3 to 8.5. Therefore, revenue streams appeared less likely from commercial customers in Mtwara. The contrary nevertheless held true for industrial customers. Whereas in Upper East the number of industries remained stalled at 10, in Mtwara their numbers doubled in merely four years. As a result, the industrial base of customers in Mtwara grew to four times that of Upper East.<sup>102</sup> Absolute numbers may be misleading, as the activity of some agricultural industries may vary throughout seasons, and a few industrial customers are state-owned water utilities that regularly incur in considerable arrears with the utility. However, the embryonic spur in industrial activity is confirmed by a consistent rise in billed revenue over the same period.

**Table 33: Number of customers per category.**

|      | Ghana       |            |            |        | Tanzania        |         |            |        |
|------|-------------|------------|------------|--------|-----------------|---------|------------|--------|
| Year | Residential | Commercial | Industrial | Total  | Low Residential | General | Industrial | Total  |
| Y1   | 32,720      | 8,630      | 10         | 41,360 | 8,858           | 1,127   | 16         | 10,001 |
| Y2   | 37,020      | 9,840      | 10         | 46,870 | 9,684           | 1,464   | 23         | 11,171 |
| Y3   | 40,690      | 11,300     | 10         | 52,000 | 11,030          | 1,759   | 27         | 12,816 |
| Y4   | 46,590      | 13,030     | 10         | 59,630 | 13,981          | 1,646   | 39         | 15,666 |

**Source: Unpublished data from NEDCo and TANESCO.**

<sup>101</sup> It is important to note that the categories of customers in Ghana and Tanzania are not wholly consistent. The General category for Tanzania includes commercial as well as residential customers in the upper echelons of consumption, above the lifeline tariff.

<sup>102</sup> By way of comparison, by December 2013 TANESCO was serving 491 medium and large industrial customers in Ilala, a district of Dar es Salaam. Ilala is the TANESCO demarcation with the largest number of industries in Tanzania.

**Table 34: Annual rates of growth (%) per category of customer.**

|       | Ghana       |            |            |       | Tanzania        |         |            |       |
|-------|-------------|------------|------------|-------|-----------------|---------|------------|-------|
| Year  | Residential | Commercial | Industrial | Total | Low Residential | General | Industrial | Total |
| Y0-Y1 | 18.3        | 18.5       | 0          | 18.4  | 4.9             | -17.3   | -30.4      | 1.7   |
| Y1-Y2 | 13.1        | 14         | 0          | 13.3  | 9.3             | 29.9    | 43.8       | 11.7  |
| Y2-Y3 | 9.9         | 14.8       | 0          | 10.9  | 13.9            | 20.2    | 17.4       | 14.7  |
| Y3-Y4 | 14.5        | 15.3       | 0          | 14.7  | 26.8            | -6.4    | 44.4       | 22.2  |

**Source: Unpublished data from NEDCo and TANESCO.**

At any rate, the major difference at the inception of prepaid meters was the increasingly contrast in the weight of industries in the customer base. Before prepaid meters were introduced, revenue collection in Mtwara was already growing due to increasingly solid income from industrial customers. As the data below will illustrate, this growth continued after the deployment of prepaid meters.

**Table 35: Growth (%) in customers and revenue, Upper East**

|         | Customers   |            |            |       | Billed energy | Revenue |
|---------|-------------|------------|------------|-------|---------------|---------|
| Year    | Residential | Commercial | Industrial | Total |               |         |
| 2008-09 | 18.3        | 18.5       | 0          | 18.4  | 11.9          | 8.4     |
| 2009-10 | 13.1        | 14         | 0          | 13.3  | 12.3          | 55.1    |
| 2010-11 | 9.9         | 14.8       | 0          | 10.9  | 11.5          | 21.7    |
| 2011-12 | 14.5        | 15.3       | 0          | 14.7  | 6.7           | 25.7    |

**Source: Unpublished data from NEDCo.**

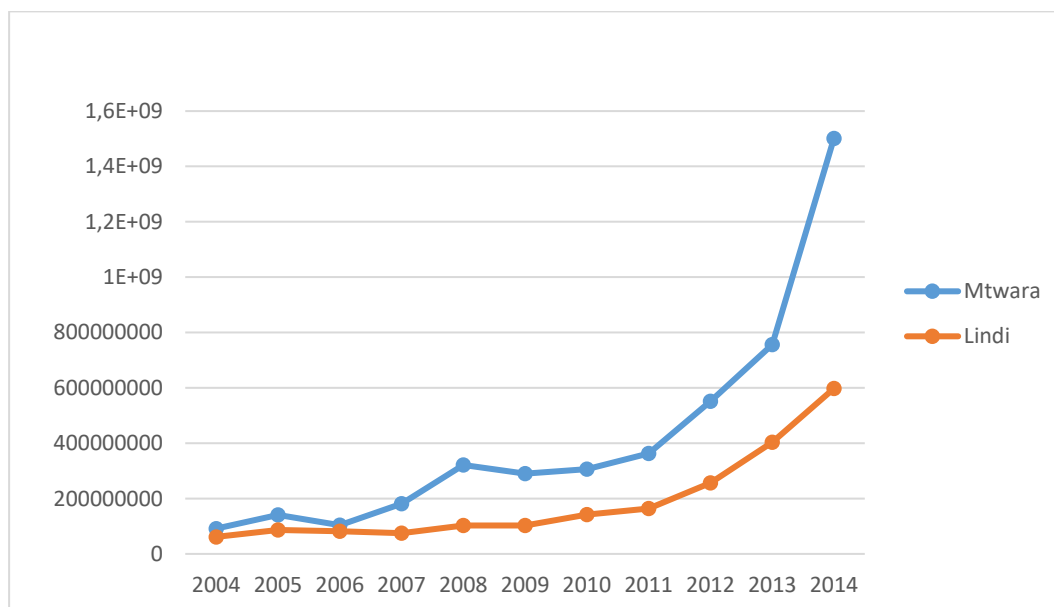
**Table 36: Growth (percentage) in customers and revenue, Mtwara**

|         | Customers   |            |            |       | Billed energy | Revenue |
|---------|-------------|------------|------------|-------|---------------|---------|
| Year    | Residential | Commercial | Industrial | Total |               |         |
| 2008-09 | 4.9         | -17.3      | -30.4      | 1.7   | 0.9           | 8.7     |
| 2009-10 | 9.3         | 29.9       | 43.8       | 11.7  | 10.9          | 62.1    |
| 2010-11 | 13.9        | 20.2       | 17.4       | 14.7  | 12.9          | 62.7    |
| 2011-12 | 26.8        | -6.4       | 44.4       | 22.2  | 5.5           | 15.3    |

**Source: Unpublished data from TANESCO.**

The spike in revenue collected by TANESCO in Mtwara was all the more salient when compared with the neighbouring region of Lindi (see figure 49). The sharp divergence that can be observed before and after the massive introduction of prepaid meters in both regions (see figure below) is also telling about the exertions of TANESCO to electrify Mtwara. The exertions paid off, and over time Mtwara caught up with the rest of regions in Tanzania (Dar es Salaam excluded). Table 37 below compares average income per customer in Mtwara and the rest of Tanzania. It shows that Mtwara started to catch up with the rest of Tanzania coinciding with the massive exercise of deployment of prepaid meters, after a serious backlash in 2011/12, suggesting a correlation between both phenomena.

**Figure 49: Revenue collected (TZS) by TANESCO in Mtwara and Lindi, 2004-2014**



**Source: Unpublished data from TANESCO.**

**Table 37: Revenue per customer collected (TZS/customer) by TANESCO in Mtwara and rest of Tanzania.**

|                   | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011  | 2012  | 2013  | 2014  |
|-------------------|------|------|------|------|------|------|------|-------|-------|-------|-------|
| Mtwara            | 92   | 141  | 103  | 181  | 322  | 290  | 306  | 363   | 552   | 756   | 1,074 |
| Rest of Tanzania  | 483  | 526  | 547  | 574  | 935  | 811  | 702  | 1,434 | 2,302 | 2,553 | 3,313 |
| Ratio Tz / Mtwara | 5.3  | 3.7  | 5.3  | 3.2  | 2.9  | 2.8  | 2.3  | 4     | 4.2   | 3.4   | 3.1   |

**Source: Own calculations from unpublished data from TANESCO. Note: Dar es Salaam excluded.**

All in all, however, the empirical analysis in this section suggests that a sweeping homogenization induced by prepaid meters has not yet occurred in Mtwara, let alone in Upper East. This does not entail however that the process of deployment of prepaid meters was not fraught with tensions, particularly in northern Ghana. As the account above has established, once the association between electrification and welfare provision has affirmed itself in northern Ghana throughout the years, the deployment of prepaid meters inevitably led to tensions with electricity-cum-welfare logic that underpinned the organizational setup.

Overall, however, the extensive deployment of prepaid meters to D1 and T1 customers over the 2000s and early 2010s left other paramount issues unaddressed. One of them is fraud amidst the 1,700 Large Power Users (or 0.24% of total customers) consuming over 7,500 kWh per month, which as TANESCO itself acknowledged accounted not only for 80% of TANESCO's revenue but also for most of non-technical losses. Only after 2007 was this issue addressed with the deployment of AMR meters (credit) for three-phase customers. AMR meters can be disconnected remotely, and trigger an alarm in case of tampering (TANESCO 2011a).<sup>103</sup>

#### **6.4. Conclusion**

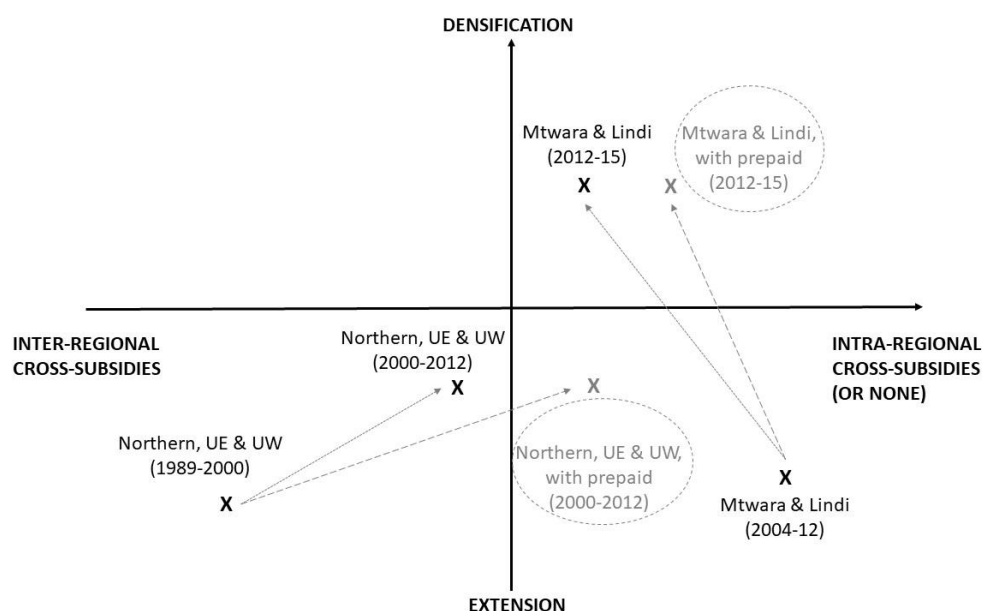
This chapter set out to explore the tensions between the potentially homogenizing effects of prepaid meters and the logics underpinning the organizational setup of provision in northern Ghana and southeastern Tanzania. The analysis was intended to unveil one tentative

<sup>103</sup> Source: TANESCO website. <http://www.tanESCO.co.tz/index.php/about-us/functions/distribution> (accessed May 14, 2017).

mechanism of reproducing (or hindering) unevenness between peripheries and other regional units. To that end, the first step has been to unveil the logics underpinning the organizational setups in each of the two peripheries analyzed in this work. Data from documentary evidence and interviews has shown that in northern Ghana the logic that prevailed equated welfare provision and electrification throughout the whole electrification scheme. This clashed to a certain extent with the introduction of prepaid meters, premised upon a purely commercial logic. The latter was not the case in Mtwara, where the economic logic, which also pervaded the organizational setup, was present since the origins of the electrification drive. Thus, the distribution utilities operating in the periphery modified to a certain degree the direction of the strategies set in the centre (represented in figure 50).

The analysis has also revealed, however, that the conflict between prepaid meters and organizational setups needs to be put in perspective. As the expansion of prepaid meters is modest in both cases, the conflict triggered by them cannot be too substantial. The analysis, however, still reveals a substantial difference in the pace of deployment between the two regions chosen for the comparison, Upper East and Mtwara. This provides another argument about the potential influence of political strategies and endowments in reconfiguring patterns of electrification via technologies of revenue collection.

**Figure 50: Territorial strategies of access and provision in northern Ghana (1989-2012) and southeastern Tanzania (2004-15), considering the incidence of prepaid meters.**



**Source: Own elaboration.**

The findings speak to the overall concern of this thesis with the production of unevenness between the peripheries and other regions. Empirically, the analysis hints to the relevance of the adjudication of tensions between organizational designs conceived in the centre and the operational strategies of the distribution utilities that operate in the peripheries. Theoretically, this chapter suggests that the model of 'unevenness by design' (Boone 2012) risks overlooking the agency of sub-national state agents in the production of unevenness. Sub-national utilities may operate under a logic that may be at odds with the designs for state reach conceived by central rulers in the capitals. The agency of sub-national actors is vital to understand how organizational setups and, more broadly, strategies of state reach are empirically adjudicated.



## 7 Conclusion

This thesis was prompted by an empirical puzzle: what regions get electricity, when, and how. As the analysis progressed in the African context, it was soon found out that sustained peripheral grid electrification as a subject matter offered an insightful way to also examine more widely the politics between the centre and the peripheries in African countries. As arguably the most centralized and top-down of all the modalities of provision of public services, electricity offers a vantage point to analyse the strategies conformed by state bureaucracies to mobilize electricity geographically. The intertwined scrutiny of access and provision in two African countries' peripheries has unveiled disparate trajectories of electrification, differentiated not only by geographical factors - in particular the availability of energy resources - but also, crucially, by uneven political strategies ("electric territorialities") premised upon distinct core-periphery linkages.

In northern Ghana, electrification unfolded as a result of a developmental drive to redress the protracted neglect of the region, but, chiefly, also in response to the highly competitive electoral system. This has been revealed by a detailed analysis of the evolving strategies of access over two periods, 1989-2000 and 2000-12. The first period saw the grid extend to district capitals and rural areas, whilst the second sought an increasing degree of urban densification. Electoral gains and developmental aspirations were not the sole drivers of electrification in northern Ghana, though. The transition of the national electricity regime toward new rules of the game such as the idea of integrating full-cost recovery into the tariffs, and the introduction of prepaid meters was also shaping electrification. Its effects have been shown in a scrutiny of the strategies of provision over the same periods. Changes in the national electricity regime jeopardized the strategy of access, as they modified the design of



cross-subsidies in the region under electrification but their design was also altered by the introduction of prepaid meters in the late 2000s. Prepaid meters stymied the possibility of deferring bill payments as a coping strategy, notably for rural dwellers in distant settlements. For distribution utilities, the enforcement of disconnections is costlier than the relatively modest losses of continuing supply even through non-payment. Prepaid meters diminished the extent of these informal, *de facto* cross-subsidies to rural dwellers.

In southeastern Tanzania peripheral electrification was prompted by the alignment between the political goals of the state to increase access nationwide and private companies' financial pressures to monetize their gas finds. This continued throughout the first period of electrification, from 2004 through 2012. As this period came to a close, the financial calculations of the private gas company proved unrealistic and the utility decided to abandon its never fully developed plans to distribute electricity across Mtwara and Lindi. Almost at the same time, the political climate in the region deteriorated, as the governmental plans to go ahead with a gas pipeline from Mtwara to Dar es Salaam created deep resentment in the population. Resentment, arguably in the form of a "infrastructural grievance," found expression in the riots of May 2013. The protests pushed the government to change tack and since 2012 it has embarked on a fresh territorial strategy of access more attuned to the plea of urban dwellers to reap the benefits of gas that they had been promised in the form of infrastructural development. The territorial strategy of provision changed less drastically. As TANESCO reasserted itself in generation and distribution, it sought to operate the region on a commercial basis, at least in the long term, relying on the low cost of electricity generated from the region's abundant gas deposits. More perceptible was the change in the deployment of prepaid meters. Driven by the national strategy to phase out credit meters in 2016, the Regional Office in Mtwara applied itself vigorously to substitute them with prepaid meters. TANESCO did this more diligently than in northern Ghana, in a move with additional distributional implications. Introducing prepaid meters in this way helped stamp out the informal subsidy to customers in arrears to a larger extent than in northern Ghana. The extension of the grid over Mtwara and Lindi, stretching over an area the size of Rwanda, extended the state's reach, as it engaged new TANESCO customers in fresh modalities of interaction with the state structured on bill payment or acquiring prepaid electricity units.

The unevenness by design in territorial strategies of access and provision found a parallel in administrative choices. Ghana set up a distinct utility to electrify the north of the country

throughout the entire electrification scheme studied in this work. By contrast, Tanzania first attempted to franchise distribution in the south east to a private utility and later granted the monopoly on distribution to the state-owned national utility. Very much in line with Catherine Boone's arguments about the strategic bargaining between central state elites and local actors (in this case, citizens) and unevenness by design (Boone 2003b, 2012), the organizational choices in Ghana and Tanzania also produced disparate trajectories of administrative reach in each country.

This study has attempted to capture all the former with the help of an analytical model proposed in the theoretical chapter. It must be recalled that this model encapsulated two claims: that to grasp territorial strategies and outcomes access and provision must be considered jointly; and that strategies of access are structured not only by the national electricity regime but also by core-periphery linkages. The benefits of the first claim are tangible in the empirical analysis. This claim has yielded a graphic representation that depicts strategies of access and provision along two axes and whose quadrants signal to different articulations of the urban-rural and inter-regional biases. Also, Northern Ghana has shown how concerns with losses (provision) altered the course of strategies to provide ample access and how the chosen administrative structure helped to shield access politically against mounting losses that would have otherwise been rendered too visible. In turn, the second claim has allowed to identify the connections between the two trajectories of peripheral electrification in northern Ghana and southeastern Tanzania, and the underlying strategies as well as the attendant spatial patterns (see table 26). Further empirical and theoretical work can yield a generalizable model specifying the connections between core-periphery linkages with territorial strategies and outcomes.

Overall, this thesis has contributed a fresh response to the question of what regions get grid electricity, when and how. This thesis claims that geography matters but hardly determines the impulse and subsequent direction of electrification schemes in regional peripheries. At least to the same degree, grid electrification may be governed by the narrow electoral calculations of incumbents and the reaction to widely felt infrastructural grievances. This claim represents a contribution to the political geography of electrification, but also of territorial statehood, as it offers a novel angle, ie electrification, from which to examine core-periphery relationships and, more broadly, the production and reproduction of national territorial regimes.

### 7.1. Limitations of this study

The force of the findings of this study should not obscure its limitations. This subsection discusses two major caveats, ie incompleteness and generalization, and suggests two directions for the refinement of the analytical model presented in chapter 2.

First, how solid can be the findings obtained from analysing events that are still unfolding? As electricity rates in northern Ghana and southeastern Tanzania remain far from universal access, grid electrification is poised to continue for many years. In Northern Ghana the mid-2010s marked a rupture with past approaches, as NEDCo apparently embarked in earnest on a program (supported by the national government and USAID) to attain full economic sustainability. The future evolution of the phenomenon under study in both regions might offer the benefit of hindsight and cast new light upon the period analysed in this thesis. Crucial undercurrents now intangible may become crucial to explain the territorial patterns observed. One possible response to this latter issue may be to reproduce the analysis done in this thesis in the early 2020s, upon the completion of the NES in Ghana (in 2020) and the attainment of a 60% access rate in southeastern Tanzania.

Second, to what extent can the findings of this thesis be generalized to other cases? Generalizing from two nearly unique cases of a phenomenon is risky. It would be wrong to assume that the trajectories of “electorally led electrification” (northern Ghana) and “grievance-led electrification” (southeastern Tanzania) studied here (and summarized in table 26, chapter 5) are representative of other possible trajectories also determined by elections and infrastructural grievances. More studies of core-periphery linkages are therefore required to establish the connections between those drivers, territorial strategies of electrification and spatial outcomes. Hence, the findings in this study may be more useful to refine existing theory (in this case, the proposed analytical model) than to provide the basis for even a ‘partial generalization’ (Lijphart 1971). This attempt at refinement is elaborated in the next section.

The difficulties of generalization are even more evident as other cases of sustained peripheral electrification in Africa to which the findings could eventually be extended, or tested against, are conspicuously scarce in the present, if not inexistent. To enhance the usefulness of the

explanations suggested in this work, comparative analysis with additional cases is required (cases that might still take a few years to mature). Even so, the analysis developed in these pages may have some predictive value. This would become evident over time in the reproduction of electrification over peripheral regions promising potential electoral rewards, in the vein of northern Ghana or over regions where new resources are found that attract government attention. In the first group are African polities that have highly competitive electoral systems, such as Kenya, Senegal or Zambia. As noted in the Introduction, Kenya and Senegal have already started ambitious grid extension programmes, and it would not be unreasonable to anticipate serious attempts at grid electrification over peripheral regions in search of electoral gains. The second group of overnight *Afriques utiles* may also provide a number of suitable candidates for peripheral electrification driven by compensation for the extraction of resources in the area. In East Africa, Kenya, Uganda and Ethiopia have made significant oil or gas discoveries in peripheral regions. Turkana county in northwestern Kenya is the poorest region of the country but recently substantive oil was found there. The western part of Uganda, bordering Lake Albert, is also home to oil exploitation, but only partially electrified. Worse still is the situation in the northwest of Uganda, where two major dams producing hundreds of megawatts are set to be built in the coming years, but with vast expanses off the national grid. However, the most similar situation to Mtwara is across the southern border of Tanzania. The area of northern Mozambique around the town of Palma also lies hundreds of kilometres away from the national grid, but hosts massive offshore gas deposits that belong to the same Ruvuma Basin as those found in Mtwara. Palma and its province, Cabo Delgado, have also been neglected for decades by both the Portuguese colonial administration and the *Frente de Libertação de Moçambique's* regime, despite the contribution of the Makonde and others from Cabo Delgado to the war of liberation (Newitt 1995; Vines et al. 2015). The parallels between Mtwara and Cabo Delgado must be taken with considerable caution but protests linked to local grievances about how to share the riches of gas have started to emerge in northern Mozambique (Symons 2016). Indeed, and as predicted by the findings in this work, the government has already started to beef up efforts to spread electricity to the region, as shown by the 75-MW gas-to-power plant

planned in Palma (World Bank 2015) and the 30-MW solar plant under construction in Cabo Delgado.<sup>104</sup>

To refine the model proposed in the theoretical chapter two immediate courses arise from the empirical findings of this study. One course concerns the deficiencies of the model in capturing how utilities mediate the strategies conceived by central bureaucracies (chapter 6). The other questions the extent to which the agency of sub-national actors, notably elites and citizens, is under-specified.

Chapter 6 has unveiled how the organizational interests of the utility in Ghana conspired, to a limited extent, against the driving core-periphery linkages shaping electrification. Mounting losses led the utility to introduce and rollout, if modestly and mostly in urban areas, prepaid meters. Further studies may reveal other instances in which the organizational interests of utilities operating in peripheries run contrary to core-periphery linkages embedded in strategies of electrification. As it is currently specified, the analytical model is unable to capture this effect because it treats the state as a monolithic structure without due attention to its various agencies and scales.

Also, and in so far as the agency of sub-national actors to influence state strategies is concerned, the model remains too state-centric. Upon viewing the cases of northern Ghana and southeastern Tanzania, this thesis has unveiled the dynamics of two processes governed by strategic bargains between the state and citizens and has identified electoral processes and popular protests, respectively, as the conduits for strategic negotiation. By putting state-citizen strategic bargains at the centre of the analysis, this thesis has opened up a new avenue for explanations of sub-national electrification. With this fresh framework in mind, much remains to be achieved. By adopting a macrosocial perspective, this thesis has not explored the details of the precise mechanisms by which citizens in communities and urban areas of the north of Ghana have mobilized politically to send signs to their MPs. Thereby, it has only touched lightly upon the specific narrative framings in which they have dressed their demands for electrification, and lastly, it has not identified the key mediators (constituency MPs, local authorities, traditional authorities, respected local figures) between the citizens and central state or the spaces where those mediations have been effected. But taken together, all these elements amount to the emergence of a distinct field of politics of

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<sup>104</sup> See <http://allafrica.com/stories/201602220357.html> (accessed June 12, 2017).

electricity at the sub-national scale instilled with the centre's electrification schemes. The sub-national politics of electricity remain completely unexplored and understanding them is vital to comprehend the "demand" side of core-periphery political linkages between the state and citizens in peripheral electrification. Study of this field could be the first step forward towards a more comprehensive theory of peripheral electrification.

State-centred explanations are, in principle, better suited to the sociopolitical realities of African peripheries. One reason is that electrification policies remain firmly in the hands of central bureaucracies, with limited involvement of local administrations throughout the planning and implementation cycle. Another reason is that in most African peripheries sub-national elites remain too weak to confront the state's strategies. Indeed, peripheral regions are often marginalized from national political settlements precisely because of the weakness of political and/or economic elites in their territories (e.g. northern Ghana, see Abdulai 2016). In that context, the conception and implementation of electrification schemes in the peripheries, as well as the subsequent routine supply of electricity, are likely to respond more directly to the design of central rulers, even more than in the general case of non-peripheral electrification. In these cases, the plans of central rulers are likely to be shaped more by broader societal and political developments than by specific demands put forth by well-organized sub-national elites. At the same time, however, peripheral electrification driven by electoral calculations, legitimacy building or regional economic re-engineering fosters the creation of sub-national constituencies with distinct, sometimes self-interested, motivations to advocate for the continuation of electrification schemes. Non-electrified communities may legitimately demand the same benefits from the state as electrified ones. To attain this, they may act strategically in the vicinity of electoral contests to raise the visibility of their demands. Northern Ghana is a case in point (Briggs 2012; Nugent 1999; Trotter 2016). Equally, discrepancies between legitimizing claims supported on publicly declared goals in electrification and realities may compel citizens to mobilize. This was the case in Ethiopia in the early stages of the massive dam construction scheme (Abbink 2012; Mains 2012). Interventions seeking to boost regional development necessarily prioritise some economic activities, and therefore particular business interests, over others. In this context, the business interests that are furthered by electrification will advocate for the continuation and eventual intensification of policies of electrification (Khennas 2012). All this suggests that both bargain- and state-centred approaches have analytical purchase to explain why some

constituencies and not others get electricity in the peripheries. At the same time, it is plain in the examples given above that constituencies of citizens have at least the same relevance than close-knit groups such as business interests do. Indeed, citizens are the paramount constituency for electoral calculations and for widespread legitimacy building. The salience of bargains with citizens from peripheries is not aptly incorporated into bargain-centred approaches, let alone by state-centred ones. State-citizens bargains must be put at the nucleus of scholarly models of peripheral electrification, but the model proposed in this thesis does not specify such bargains in detail nor does it incorporate the reconfigurations of the distributional settlement in the national electricity regime that can be anticipated from the growing weight of the voice of dozens of thousands of newly electrified citizens in regional peripheries.

## **7.2. Towards a middle range theory of electrification in the production of African territorial regimes**

One helpful strategy to countervail the challenges presented by any attempt at generalisation and to extend the analytical purchase of the analytical framework developed in this work is to advance towards a research agenda that complements the one already pursued and centred upon peripheral electrification.

Building upon the findings of this thesis, one possible complementary research agenda may examine the whole polity as its unit of analysis. This research project might interrogate the role of grid electrification in the production of uneven territorial regimes. This research agenda would examine the political-territorial arrangements that are singular of three entwined but distinctive processes: the electrification of peripheries, semi-peripheries and core regions. Between these categories, strategies and spatial patterns are likely to differ considerably, hence hinting to distinctive political-territorial arrangements. Taken together, the compact of regional political-territorial arrangements within one country would define a territorial regime. The term territorial regime denotes here a middle range territorial settlement governing the adjudication of distributional issues across regions and populations within those regions, thus situated at a lower level of abstraction than the common usage of territorial regimes in the literature (eg federalism, consociationalism, etc). To characterise the role of electrification in territorial regimes, the tools developed in this thesis (the

analytical model and the methodology that examines spatial patterns and strategies and links them with political linkages) would only require partial adjustments. A middle range theory of production of territorial regimes in electrification would be of extreme value as a distinctly spatial complement to the national electricity regime also posited in this thesis.

### **7.3. Complementary directions for future research**

Before concluding, three possible options for further research may be suggested: a) the mobilization of sub-national infrastructural grievances by national and, especially, local political actors; b) the formation of sub-national electricity regimes; and c) the articulation of electric social contracts. These contributions point to a new research agenda on “access transitions” as one possible stream within the burgeoning energy transitions agenda (Baptista 2018).

#### **7.3.1. The mobilization of sub-national infrastructural grievances**

The first direction for further research would look to the short-term strategic mobilization of peripheral “infrastructural grievances.” In the two cases studied, the strategies of electrification of rulers in the centre contributed to mobilize politically local residents and, consequently, to redraw the linkages between core and periphery. In northern Ghana, local residents articulated an ingenious response to the search for votes of the political elites in Accra. Mobilizing slogans such as ‘no electricity, no vote’, they sought to capture the attention of MPs, District Assemblies and policymakers in Accra. Urban residents in Tamale took to the streets to protest the increasing cost of electricity, in response to the drift toward full-cost recovery growingly inscribed in the policies inspired by the national electricity regime. A critical mass of citizens in the North was thus projected into the nationwide politics of the kilowatt, a consequence of their gaining access to electricity. Although not in the peripheries, Ghanaian citizens embarked upon a sustained cycle of protest as a consequence of the load shedding programme in 2011-2016 (L. MacLean et al. forthcoming). Through these two processes, electoral linkages and infrastructural grievances gained weight in the existing repertoire of core-periphery linkages between Accra and the three northern regions. In the southeastern Tanzania, the choice of the government to employ the gas from Mtwara



to generate electricity in Dar and not locally was a major motivation behind the riots of 2013. The disturbances revealed infrastructural grievances associated with electricity (and, obviously gas) as a central linkage between core and periphery, in a seismic change that may seemingly affect electoral behaviour in the near future.

Despite constituting a major force for social mobilization and a chief driver of centre-periphery intra-elite tussles, local infrastructural grievances have thus far not been subject to a systematic treatment within African Studies literature. This void becomes all the more evident when compared with the burgeoning literature on food riots in the late 2000s throughout Africa (Bush 2010; Engels 2015b; Sneyd, Legwegoh, and Fraser 2013). Only popular petitions over inexistent electric grids have received attention, particularly in connection with electoral dynamics, as noted above. The few studies that address electric grievances have been limited to urban constituencies and movements (Honwana 2015), such as *Y'En a Marre* in Dakar in 2011-12 (Demarest 2015; Dieng 2015). More common in the literature, though, have been scattered references to popular and elite demands for roads and, noticeably, bridges, e.g. the Mbutu and Mkaapa Bridges in Tanzania (Killian 2007; Rosenzweig 2015), the Katima Mulilo Bridge linking Zambia and Namibia (Zeller 2009), and the Shia and Nyive bridges in Ghana (Nugent 1999). These examples speak to the visibility of infrastructure in providing the *casus belli* for broader causes for social movements in peripheral regions. But in addressing concerns about poor infrastructure in the peripheries, the literature has overlooked expressions of popular anger about electricity supply in peripheral cities, e.g. the frequent demonstrations in Tamale, Wa and Bolgatanga, Ghana. Research on infrastructural grievances would open up a whole new field to centre-periphery relations around questions such as how are infrastructural grievances on electricity articulated, what actors take the lead in mobilizing peripheral populations around infrastructure, and what their motivations are, what factors influence their strategies, how they engage with the political centre, how peripheral actors build advocacy coalitions with actors in the centre, and what the strategies of state actors in the centre are.

### **7.3.2. Sub-national electricity regimes**

The second direction for future research would be to study sub-national electricity regimes. It would be possible to extend to the sub-national scale the notion of “national regime.”

National regimes provide regularities that determine the provision of electricity over national markets. The concept of regime was suggested by the political economy of electricity and science and technology studies of electrification (F. W. Geels 2005; Frank W. Geels et al. 2016; van der Vleuten and Högselius 2012; van der Vleuten and Raven 2006), and found its first articulation in the Danish electricity regime (Thue 1995). The same literature, however, has said little or nothing about persistent disparities in provision at the sub-national level, potentially coalescing around differentiated sub-national electricity regimes. This silence has persisted despite the growing interest in the sub-national dimension of energy phenomena in industrialized countries (Coutard and Rutherford 2010; Muinzer and Ellis 2017; Netherton 2007; Späth and Rohrer 2010). Peripheral electrification, if sustained over time, offers an opportunity for the emergence of differentiated sub-national regimes of electricity. In line with the analysis in this thesis, such regimes would entail disparate strategies of access as well as divergent distributional settlements across regions within the same polity. Sub-national electricity regimes would evolve as a result of a dense web of interactions with the national electricity regime and with transnational actors. The theory of Strategic Action Fields can be most helpful to study the evolution of national regimes (Fligstein and McAdam 2011, 2012). This analytical lens can help to survey the complex intertwined evolution of national and sub-national electricity regimes, but also of national and sub-national political systems around core-periphery linkages. Each sub-system can be characterized as a field with its own internal dynamics and populated by actors vying for strategic advantage. Emphasizing the strategies of actors to secure policy benefits but also discursive advantages, Strategic Action Fields theory can contribute a rich tradition of organizational and cultural institutionalism (Battilana, Leca, and Boxenbaum 2009; DiMaggio and Powell 1983; Levy and Scully 2007). The analysis can also gain much from the singular attention that historical institutionalism pays to power relations (Lockwood et al. 2016).

### **7.3.3. Electric social contracts**

Lastly, the third direction for future study looks to the fluidity and persistence of extant 'electric social contracts' over intermediate time scales that are shorter than the *longue durée* (Braudel 1980). Electrification places newcomers in political relations with the state, but at the same time modifies the terms of the relationship between society and the state

for those who were already served. Providing electricity is a public service infused with the imaginaries of modernization, promises of economic activity and access to multiple amenities such as information, communication, education, attenuation of household chores, etc. If supply expands continually, the result is an increase in the frequency and salience of electric issues on the public agenda that redraws the prevailing “politics of the kilowatts.”<sup>105</sup> When access increases and the customer base swells with substantial numbers of new users, two effects follow. One brings about a new point of equilibrium between residential and industrial users. More often than not, mass electrification yields increases in residential demand that outpace growth in the industrial segment (Bekker et al. 2008; EC 2014; McDonald 2009a). As residential consumption grows in relative weight, the petitions of residential users regarding tariffs, reliability and subsidies, also gain political traction. Industrial interests often respond by intensifying their lobbying to either defend or even improve their standing in the extant distributional settlement (McDonald 2009b). This double movement may end up with a new distributional settlement. A second effect, closely associated to the first, is the emergence of protests and other modalities of political contention over issues associated to electricity provision, often tariff hikes. This effect tends to appear in polities where access to electricity is broad. In polities where access is low the major demand from the citizenry is access but in those where access is sufficiently widespread, reliability (concerns with blackouts and unstable voltage) is more important, as the salience of poor electricity supply in the defeat of the incumbent president in Ghana’s 2016 elections aptly illustrates. This phenomenon is especially intense in upper middle income countries and negligible in low income countries (Leo, Morello, and Ramachandran 2015). Consequently, protests around electricity supply may erupt regularly. Trade unions and grassroots movements, for instance, have a long track record of taking to the streets against tariff hikes, the installation of prepaid meters or load shedding exercises (Edjekumhene and Brew-Hammond 2003; L. MacLean et al. forthcoming; Wafer 2012). Needless to say, electricity protests have not reached the scale of fuel protests over the removal of subsidies to petrol (Alleyne 2013; Branch and Mampilly 2015), let alone the breadth and intensity of the food riots of the late 2000s and early 2010s (Bush 2010; Engels 2015a). Nonetheless, electricity protests have synergized with less visible expressions of

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<sup>105</sup> Attendant effects on generation and transmission, ie “the politics of the megawatts,” are equally important but beyond the scope of this study, which is limited to distribution.

disgruntlement. Users of electricity in African polities have routinely engaged in forms of resistance that mobilize a wide range of Scott's (1985) "weapons of the weak," e.g. illegally hooking their households to nearby distribution grids, bypassing meters, avoiding bill payments through bribes or recourse to social networks, or configuring their own 'incremental' community networks (Silver 2013; Winther 2012). In a continent where only four in ten citizens rate their governments as performing well or fairly well in ensuring supply and reliability of power (Afrobarometer 2016), it is not difficult to find a breeding ground for protest. Recurrent statements by presidents and ministers announcing yet another power plant, or yet another electrification scheme in this or that rural area, often followed by delayed delivery, may well increase discontent instead of quelling it. Providing access can also backfire for governments if citizens, particularly in rural areas, are not well informed about the monthly cost of electricity. Sometimes, discontent may draw upon protracted patterns of infrastructural neglect in peripheral regions. Combining electric with more ample "infrastructural grievances" over poor roads or lack of water and sanitation, protests in the peripheries may become de-stabilizing for regimes and elites in the capitals due to their capacity to undermine narratives of legitimization that present the state as developmental and delivering (Abbink 2012; Mains 2012). If electrification is sustained over time it may redraw the extant politics of the kilowatts in two directions: redefining the settlement between residential customers and industrial interests, and fanning the flames of contention between state and citizens.

Regrettably, the politics of generation ("the politics of the megawatts") has received a lot of attention, especially in the burgeoning literature about the renaissance of "electric high modernism" (Abbink 2012; Dye 2016). The politics in the distribution segment (the politics of the kilowatts) have been relatively overlooked. But the distribution segment is nevertheless the arena in which the distributional conflicts across different strata of society, as well as between society and the state, are more fiercely fought. The costs of generation, transmission and distribution are adjudicated across sections of society and institutional actors, as an outcome of the politics of the kilowatts. The sectoral reforms of the last two decades in African electricity regimes have to a large extent sought to transfer the economic burden and the risk from private generators to customers (with the partial exception of those users in the lifeline category). Full-cost recovery in tariffs and prepaid metering are two major techniques in this drive. If looking at generation is an advantageous way to see state-business

relations and political settlements, distribution offers a vantage point to examine state-society relations in full perspective.

It is not unreasonable to posit that the modalities in which electricity is demanded and provided constitutes a crucial element in the productive social contract between citizens, elites, organized interests, and states (Nugent 2010). From here, as argued about infrastructure in the Democratic Republic of Congo (Schouten 2013) or, more vaguely, in Ghana and Uganda (L. MacLean et al. forthcoming), there is only a step to putting forth the notion of an “electric social contract” as the intersection of the demands of citizens and the delivery of states at any given period. But few have taken this step and most often only partially (Elias and Victor 2005; Tinto and Banda 2005). Recent phenomena, viewed from this perspective, such as Ethiopia’s massive infrastructural “renaissance” (Mains 2012), or Rwanda’s analogue infrastructural high modernism (Dye 2016), would take on a new shape. Two examples may help to flesh out the concept of the electric social contract. One is the evolution of the social contract in Africa. Upon independence, a social contract on infrastructure between the state and citizens consolidated slowly. It laid out the boundaries of what infrastructural development citizens could legitimately expect, how much of its costs they were expected to shoulder (*vis-à-vis* the state), and how far infrastructure would reach geographically. This contract also covered electricity, as the boom in dam construction of the 1960s and 1970s proves. The covenant shifted dramatically in the two decades of crisis of the late 1970s and 1980s, and again in the early 2000s, in the latter period prompted by the U-turn in the economic cycle that made some African states start to deliver infrastructural development again deliver accordingly. The second example concerns the same evolution in Europe. Over the last decade or so, fuel poverty has spread across Europe (Bouzarovski and Tirado Herrero 2015; Thomson and Snell 2013). Various measurements of fuel poverty have been employed. The most common by far puts fuel poverty at expenses above the 10% of household monthly income. Even though this threshold may be arbitrary, in a sense it captures a widely held citizen expectation that the state must ensure the provision of electricity, either directly or via market regulation, at an affordable cost. At least this was the prevailing understanding in the glorious decades of the welfare state in Western Europe, but also to a lesser degree even in the subsequent neo-liberal wave, until very recently. The failure of some European states to secure the supply of electricity at a cost below the 10% threshold can be legitimately read as a breach of the extant electric social contract, with dire

consequences for social and political cohesion across Europe. In brief, the notion of an electric social contract helps to frame more comprehensively, but also more precisely, the drift in citizens' expectations and public modalities of delivery. Interestingly, social contracts also entail a geographical dimension. From this angle the non-uniform delivery of public services across the realm, particularly to peripheral regions, the eruption of infrastructural grievances in neglected regions, as well as the politics of their mobilization by political entrepreneurs, opposition parties, and other social actors with at least a modicum of legitimacy vis-à-vis local populations can be perceptively captured. The notion of an electric social contract is a comprehensive and perceptive analytical tool to grasp the long-term political economies of public service delivery, but also the political geographies between centre and periphery.

This thesis set off asking itself about what regions get electricity, when and how. Upon deeper inspection of the problem in African peripheries, the subject soon revealed itself as important in the understanding of core-periphery politics. This work attempted to bring together two literatures: the political economy of electrification and the political geography of core-periphery linkages. At the intersection of these two literatures, this thesis has studied the territorial strategies of electrification deployed by two African states in their peripheries. The analysis has shown how electrification in northern Ghana and southeastern Tanzania has changed those regions quantitatively but not their peripheral condition. Originally, the two regions remained marginalized from access to electricity due to the combination of a lack of interest from central elites and their own political weakness within the national political system. Access to electricity did not challenge their peripheral status; it only altered the nature of their peripheral insertion in the national political system. As the thesis has shown, in both cases grid electrification had to respond to geographical constraints but also, crucially, to political considerations including electoral calculations and local grievances. The combination of both drivers inevitably required a politico-institutional arrangement, reflected in distinct territorial strategies of electrification ("electric territorialities") parting from the strategies inscribed in the national electricity regimes. Peripheral electrification in Ghana and Tanzania enacted a re-territorialisation of supply and also reproduced extant patterns of core-periphery relations. Whether those phenomena will continue to progress in the same direction in the future remains to be seen, as the electrification schemes of Ghana

and Tanzania are far from complete. So far, the production of territorial regimes via the electrification of these two African peripheries continues to reproduce disparate patterns of statehood across the realm, paving the way for the strategic mobilization of those differences by national and sub-national political actors.

## 8 Appendixes

### 8.1. Maps

**Map 1: Administrative map of Ghana.**

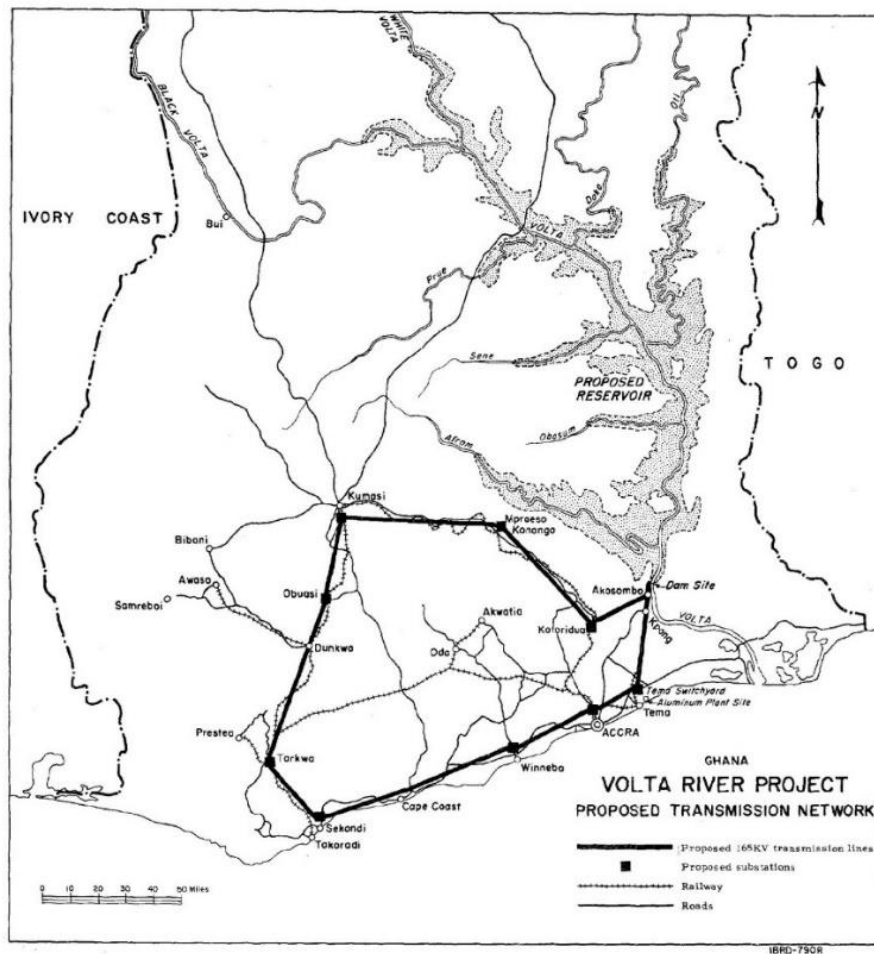


Source: United Nations Geospatial Information Section.<sup>106</sup>

<sup>106</sup> <http://www.un.org/Depts/Cartographic/english/htmain.htm> (accessed June 30, 2017).

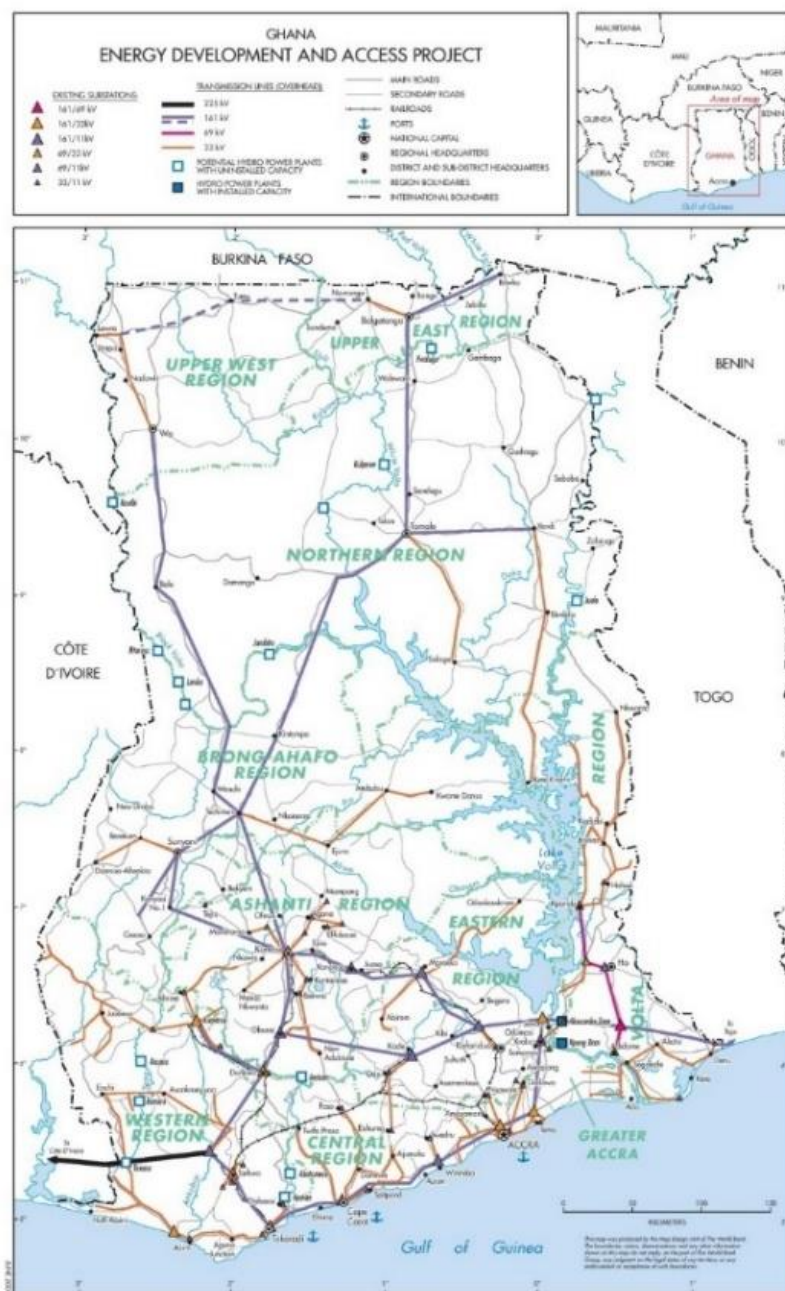


**Map 2: The Volta River Project proposed transmission network.**



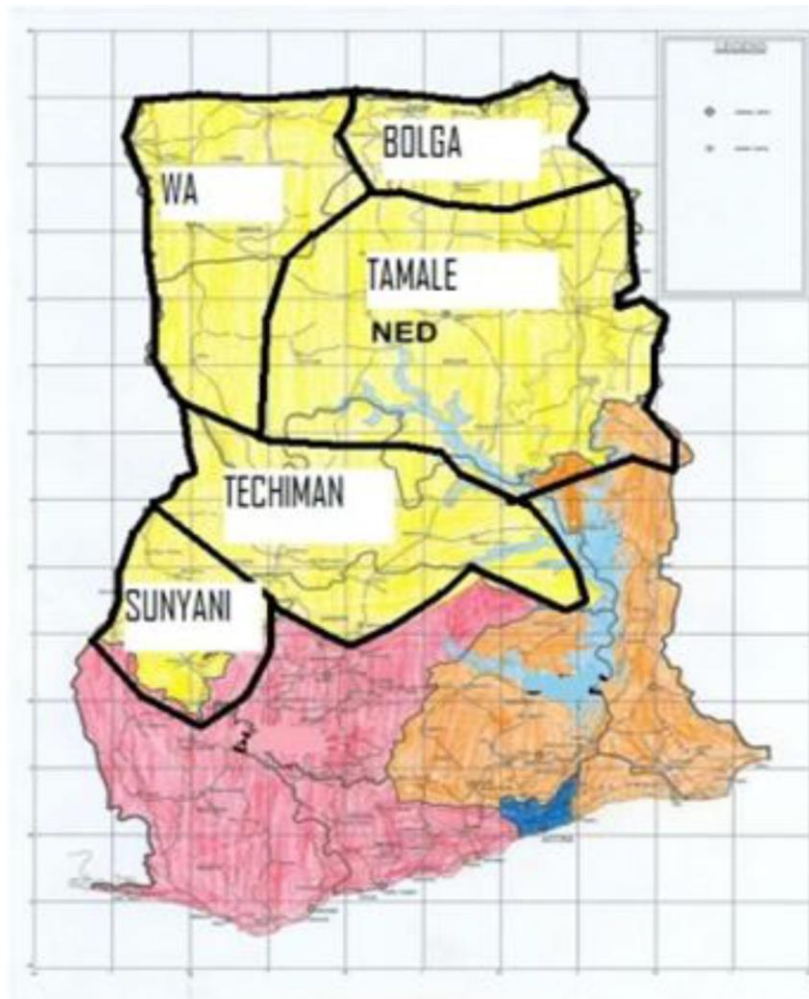
**Source: International Bank of Reconstruction and Development (1961).**

Map 3: Ghana Transmission Network, 2007.



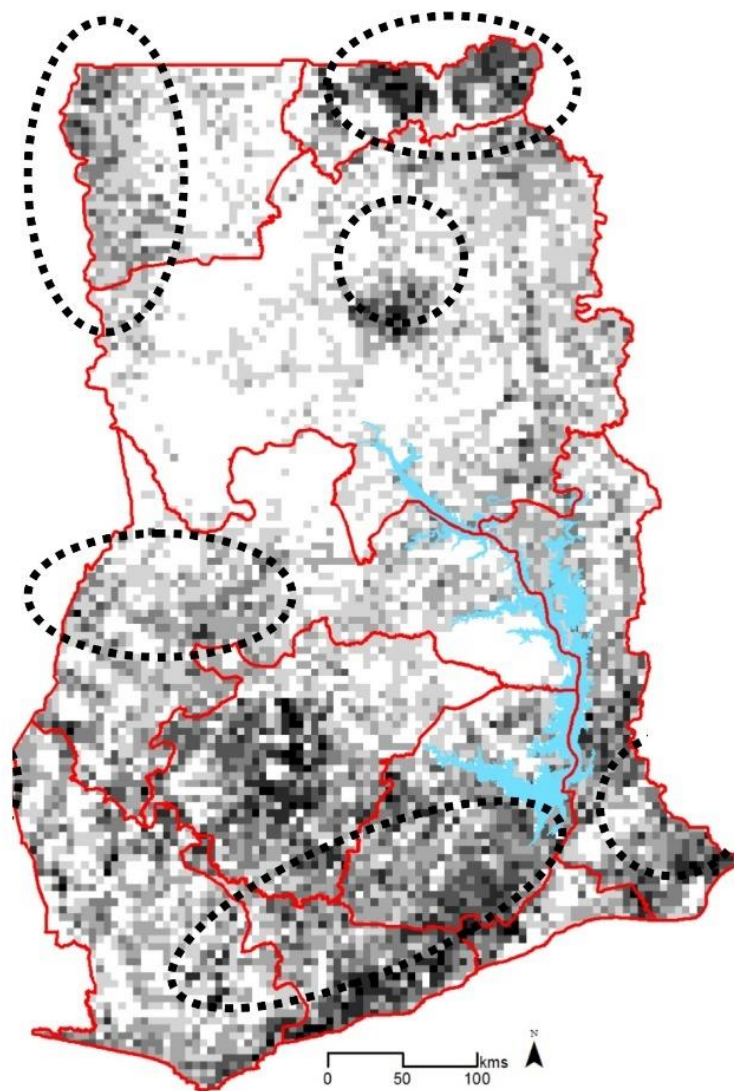
Source: World Bank (2007a).

**Map 4: Operational area of NED/NEDCo, and five major demarcations.**



Source: Ghana Millennium Challenge Account (MCA 2012b).

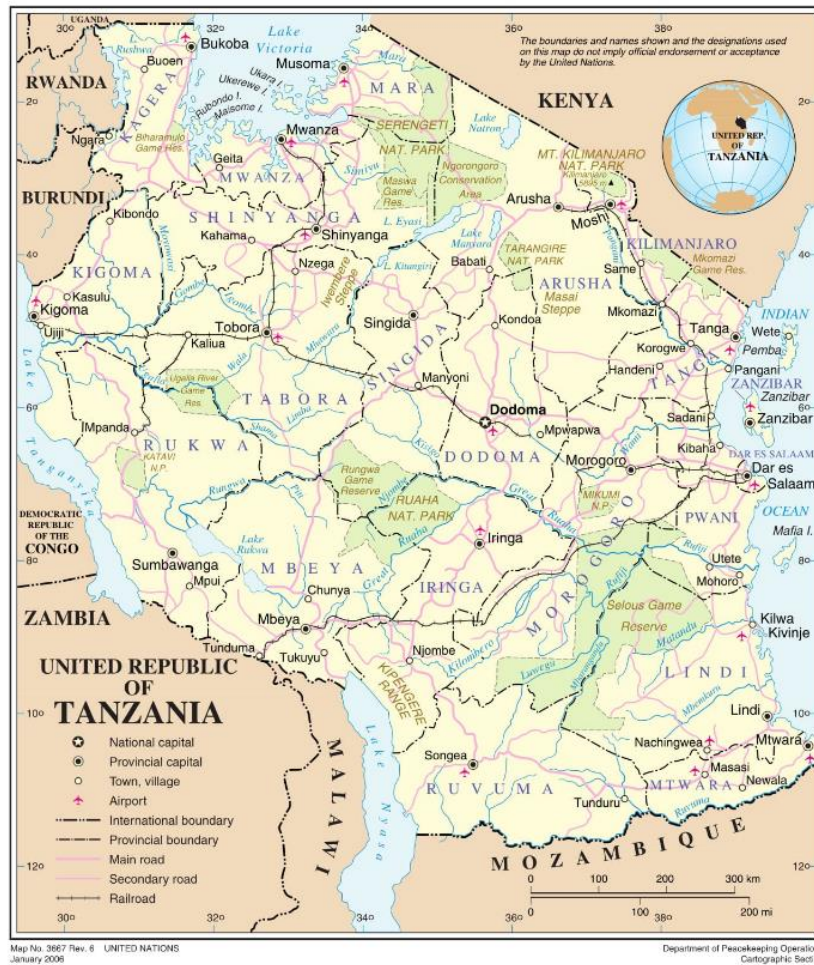
**Map 5: Map of population density in Ghana, 2010.**



**Source: Government of Ghana and COWI (2015, 102).**

**Map 6: Districts of northern Ghana. Note: Some districts are disaggregated into two electoral constituencies.<sup>107</sup>**



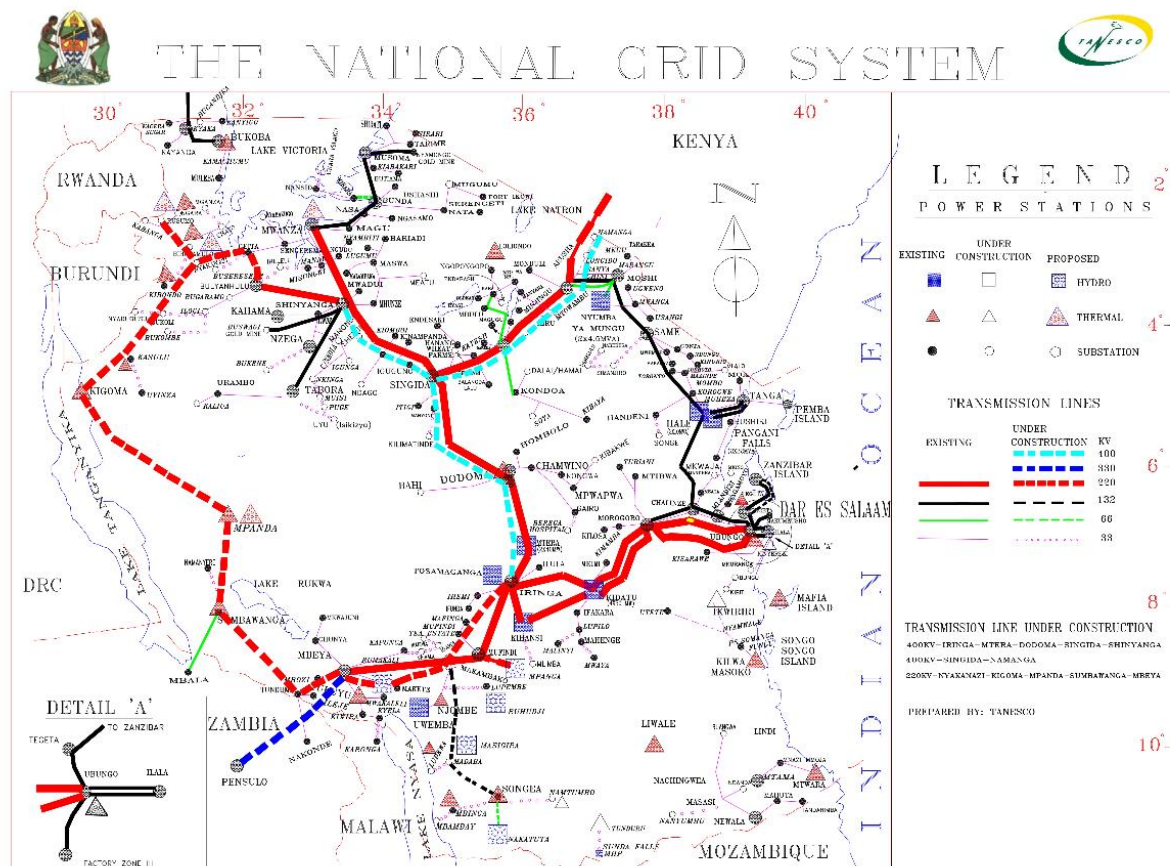
**Map 7: Administrative map of Tanzania.**

Source: United Nations Geospatial Information Section.<sup>108</sup>

<sup>108</sup> <http://www.un.org/Depts/Cartographic/english/htmain.htm> (accessed June 30, 2017).



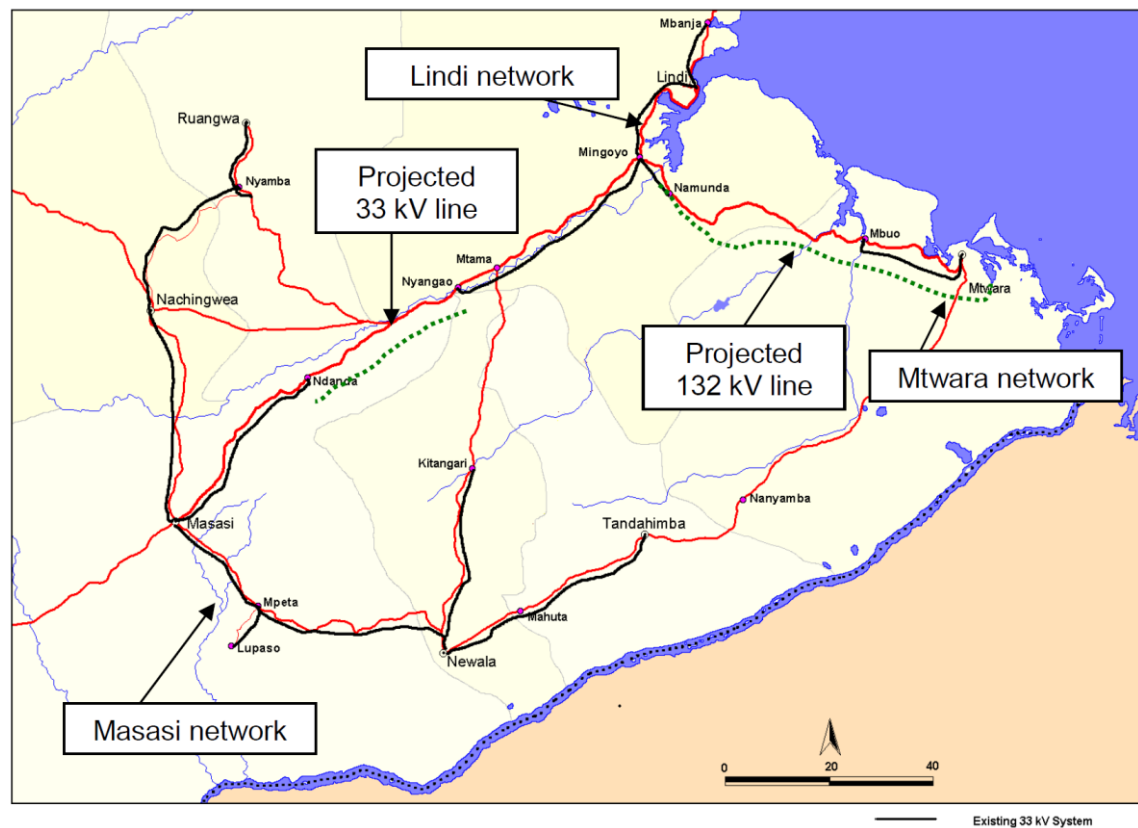
Map 8: Map of the national grid system of Tanzania, 2012.



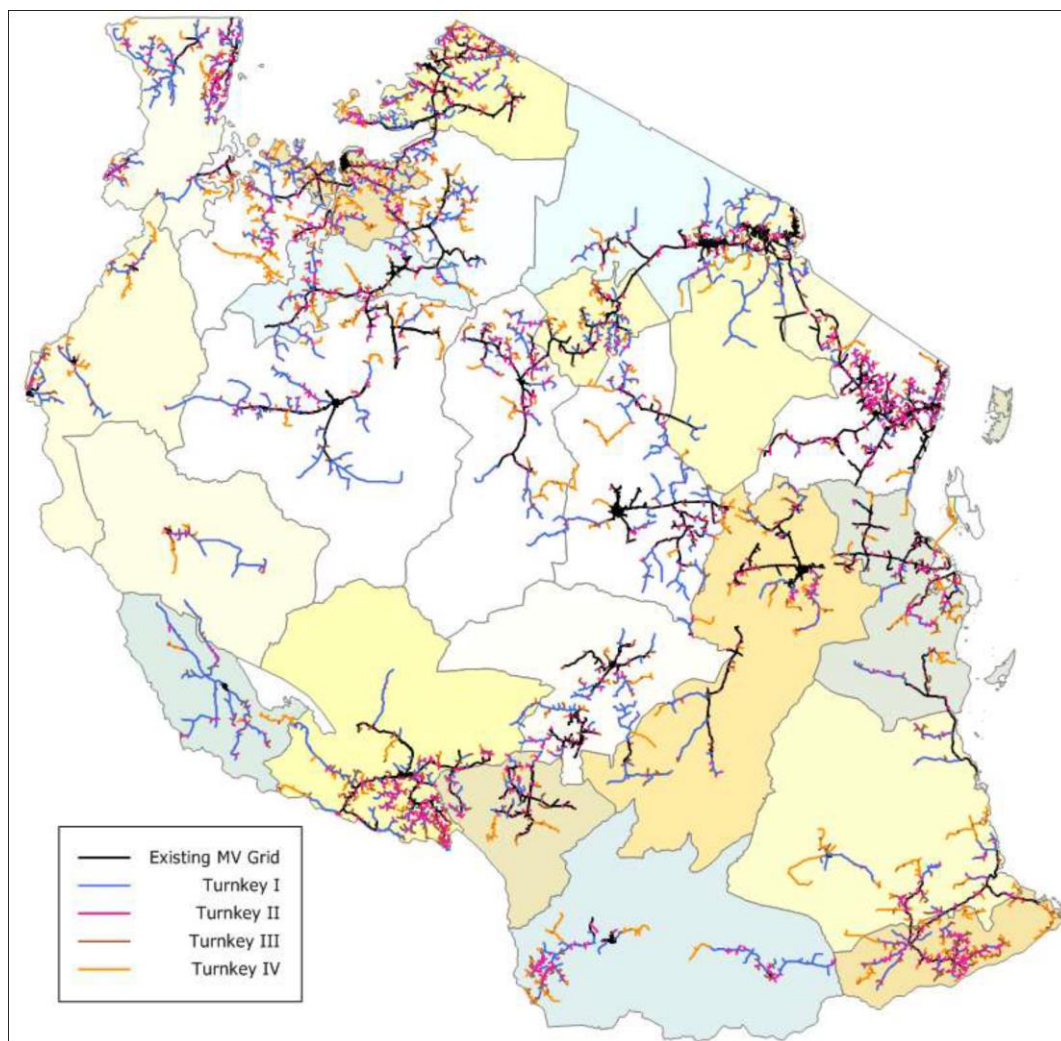
Source: TANESCO.



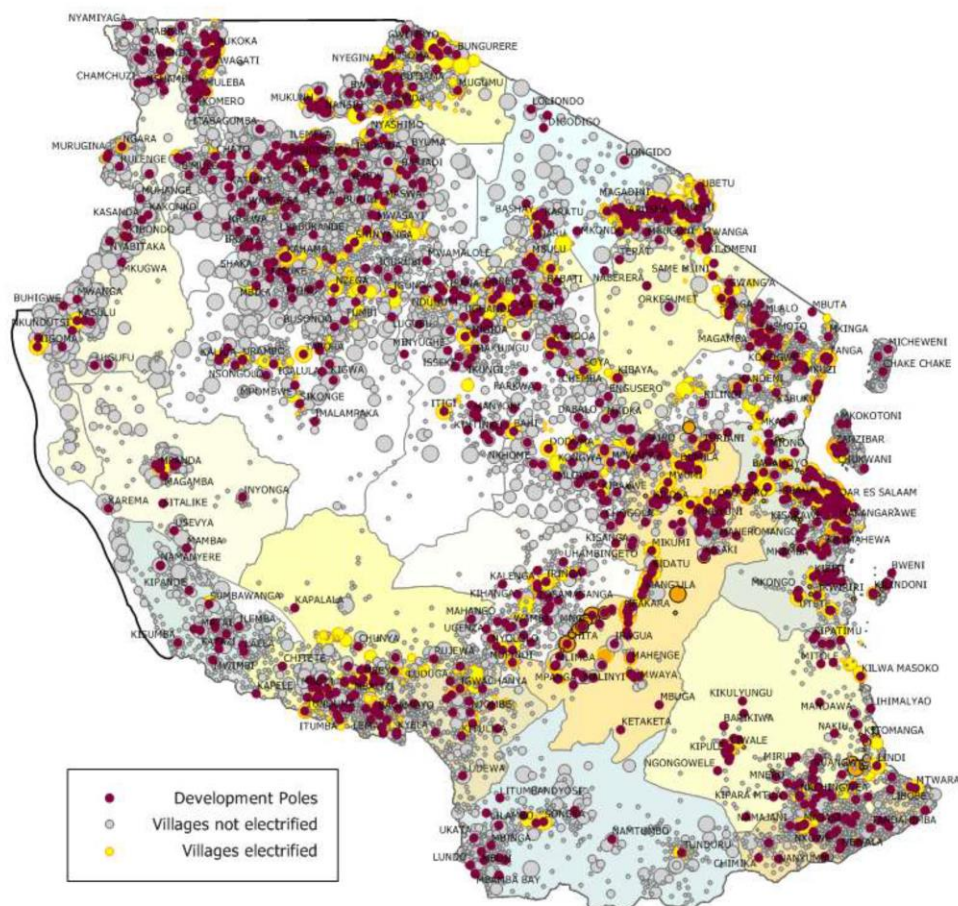
**Map 9: Southeastern regional electric grid, before and after amalgamation in 2010.**



Source: UNFCCC (2008).

**Map 10: Existing and projected medium voltage, distribution lines, Tanzania, 2013.**

Source: Innovation, Énergie et Développement (2014a).

**Map 11: Distribution of development centres and electrification status, Tanzania, 2013.**

Source: Innovation, Énergie et Développement (2014a).

## 8.2. List of informants

**Table 38: List of informants in Ghana.**

| No. | Date         | Name                 | Position  | Organisation  |
|-----|--------------|----------------------|---|---|
| 1   | 6 Aug. 2013  | Dzodzi Tsikata       | Associate Professor, Institute of Statistical, Social and Economic Research | University of Ghana                                 |
| 2   | 6 Aug. 2013  | Paolo dalla Stella   | Energy Programme Manager  | UNDP Ghana  |
| 3   | 7 Aug. 2013  | Felix Asante         | Director  | ISSER   |
| 4   | 9 Aug. 2013  | Emmanuel Debrah      | Head  | Dpt. Political Science, UoG                         |
| 5   | 13 Aug. 2013 | Sulemanu Koney       | Director Research, Analysis, Finance  | Ghanaian Chamber of Mines                           |
| 6   | 13 Aug. 2013 | Seth Adjei Boye      | Project Manager   | Embassy Switzerland                                 |
| 7   | 15 Aug. 2013 | Rose Mensah-Kutin    | Director  | ABANTU for Development                              |
| 8   | 16 Aug. 2013 | Thomas Chen          | Energy Specialist   | US Embassy  |
| 9   | 27 Aug. 2013 | Samuel Adu-Asare     | Consultant  | Board Abantu, Association Ghanaian Solar Industries |
| 10  | 27 Aug. 2013 | Eric Ofori Nyarko    | Social & Environmental Impact Officer                                       | Energy Commission                                   |
| 11  | 27 Aug. 2013 | Solomon Adjetei      | Director of Power   | Ministry of Energy                                  |
| 12  | 28 Aug. 2013 | Henry Vanderpuye     | Engineer  | GEDAP, Ministry of Energy                           |
| 13  | 3 Sep. 2013  | Miguel Zaldívar      | Intern  | ICEX, Spanish Embassy                               |
| 14  | 10 Sep. 2013 | Agnes Apusiah        | Lecturer  | UDS, Tamale   |
| 15  | 12 Sep. 2013 | Danladi Bukari       | Manager Upper East  | NEDCo   |
| 17  | 12 Sep. 2013 | Anonymous            | Senior officer  | GRIDCo, Tamale                                      |
| 18  | 13 Sep. 2013 | Alhaji Mohammed Siam | Corporate Relations   | NEDCo   |
| 19  | 17 Sep. 2013 | Mohammed Mutala      | Renewable Energy Advisor  | SNV   |
| 20  | 17 Sep. 2013 | Thomson Agalab       | Commercial Officer  | NEDCo   |

| No. | Date         | Name                    | Position                                | Organisation                          |
|-----|--------------|-------------------------|---|---------------------------------------|
| 16  | 18 Sep. 2013 | Amadu Mahama            | Chairman                                | New Energy, Tamale                    |
| 21  | 18 Sep. 2013 | Isaac Boakye            | Area Commercial Manager, Tamale         | NEDCo                                 |
| 22  | 25 Sep. 2013 | Raymond Ayinne          | External Affairs                        | Afrikids Ghana                        |
| 23  | 25 Sep. 2013 | Philip Ayamba           | Director                                | Community Self-Reliance Center, Bolga |
| 24  | 30 Sep. 2013 | Patience Ayamba         | Gender Officer                          | CENSUDI                               |
| 25  | 30 Sep. 2013 | Vincent Subbey          | Director                                | TRAX Ghana                            |
| 26  | 30 Sep. 2013 | Alfred Agyenta          | Bishop                                  | Catholic Church                       |
| 27  | 1 Oct. 2013  | Zakaria Rango           | Project Manager                         | ZOVFA                                 |
| 28  | 2 Oct. 2013  | Yakubu Alhassan Abukari | Co-ordinating Director                  | Municipality Bolga                    |
| 29  | 2 Oct. 2013  | Freeze Bodiwelme        | Electrical Contractor                   | Mr. Freeze                            |
| 30  | 2 Oct. 2013  | Awal Ahmed              | Project Manager                         | RISE-Ghana                            |
| 31  | 3 Oct. 2013  | Gatanga                 | Administration officer                  | Dr. Amiah Hospital                    |
| 32  | 3 Oct. 2013  | Ayamga H. Epona         | Director                                | Asankunde Memorial Hospital           |
| 33  | 3 Oct. 2013  | Jacob Tee Nartey        | Electrical Contractor                   | ExTee                                 |
| 34  | 4 Oct. 2013  | Clement                 | Accounts Officer                        | Widows and Orphans Movement           |
| 35  | 4 Oct. 2013  | Benedicta Pealore       | Operational Base Team Leader            | World Vision                          |
| 36  | 4 Oct. 2013  | Shauwa (?)              | Project Manager                         | BEWDA                                 |
| 37  | 5 Oct. 2013  | John Esel               | Head Distribution Unit                  | NEDCo                                 |
| 38  | 5 Oct. 2013  | Moses A. Bugri          | Electrical Contractor                   | N/A                                   |
| 39  | 6 Oct. 2013  | Simons                  | Pastor                                  | Ebenezer Methodist Church             |
| 40  | 7 Oct. 2013  | David Aladi             | Reverend                                | High Powered Ministries               |
| 41  | 7 Oct. 2013  | Rev. Amagyei            | Reverend                                | Presbyterian Church                   |
| 42  | 8 Oct. 2013  | Chief Naba Sigri Bewong | President                               | Regional House of Chiefs              |
| 43  | 8 Oct. 2013  | Richard Kansang         | President Assoc. Electrical Contractors | Richmanda Engineering Ltd.            |
| 44  | 9 Oct. 2013  | Simon Ayamboya          | Finance Officer                         | Afrikids Hospital                     |
| 45  | 9 Oct. 2013  | Asumbene Sam Julian     | Acting Regional Secretary               | TUC Upper East                        |

| No. | Date         | Name                | Position                             | Organisation                   |
|-----|--------------|---------------------|--------------------------------------|--------------------------------|
| 46  | 10 Oct. 2013 | Abdul Korah         | Regional Co-ordinating Director      | Regional Co-ordinating Council |
| 47  | 10 Oct. 2013 | John Yamoah         | Area Engineer                        | NEDCo, Upper East              |
| 48  | 10 Oct. 2013 | Kofi Samuel Osei    | Acting Area Commercial Officer       | NEDCo, Upper East              |
| 49  | 17 Oct. 2013 | Hon. John Akaribo   | President                            | Peasant Farmers Association    |
| 50  | 21 Oct. 2013 | Tampuri Tayeb       | Planning Engineer                    | NEDCo, Head Office             |
| 51  | 29 Oct. 2013 | Essel Ben Hagan     | Consultant                           | N/A                            |
| 52  | 31 Oct. 2013 | George Hagan        | Former Chairman Board                | ECG                            |
| 53  | 1 Nov. 2013  | Anonymous           | Governance Unit                      | European Commission            |
| 54  | 13 Nov. 2013 | Kofi Ellis          | Director Business Planning and Dev't | VRA                            |
| 55  | 15 Nov. 2013 | Robert Saka         | Assistant Manager - Regulation       | PURC                           |
| 56  | 20 Nov. 2013 | Stephen K. Doku     | Director Power                       | Ministry of Energy             |
| 57  | 20 Nov. 2013 | Andrew Barfour      | Director GEDAP                       | Ministry of Energy             |
| 58  | 21 Nov. 2013 | Emmanuel Baiden     | Chief Economist, Assistant to Board  | ECG                            |
| 59  | 26 Nov. 2013 | Ishmael Edjekumhene | Executive Director                   | KITE, Accra                    |
| 60  | 29 Nov. 2013 | Clement Abavana     | Former Northern Director             | VRA                            |



**Table 39: List of informants in Tanzania.**

| No. | Date         | Name                         | Position                                 | Organisation                      |
|-----|--------------|------------------------------|--|-----------------------------------|
| 1   | 14 Apr. 2014 | Estomih Sawe                 | Director                                 | TaTEDO                            |
| 2   | 15 Apr. 2014 | Alfred Mwapugi               | Former Permanent Secretary, 2006-2010    | Ministry of Energy, Dar es Salaam |
| 3   | 17 Apr. 2014 | Marcos Sampablo              | Project Officer, Energy                  | EU Delegation                     |
| 4   | 8 May 2014   | Maneno Katyega               | Former Deputy MD Finance                 | TANESCO                           |
| 5   | 21 May 2014  | Eng. Robert Semsella         | Manager Electrification                  | TANESCO, Head Office              |
| 6   | 10 June 2014 | Mr. Omari                    | Regional Accountant                      | TANESCO, Mtwara                   |
| 7   | 19 June 2014 | Mr. Aziz Salum (& Mr. Omari) | Regional Manager                         | TANESCO, Mtwara                   |
| 8   | 20 June 2014 | Dickson Nyakitinga Mbita     | Project Manager                          | Africare, Mtwara                  |
| 9   | 23 June 2014 | Mawazo Mateje                | Project Manager                          | VSO, Mtwara                       |
| 10  | 25 June 2014 | Rashid Mtima                 | Acting Municipal Director, Head Planning | Municipality, Mtwara              |
| 11  | 26 June 2014 | Nashir Pontia & others       | Executive Secretary                      | Sajaku Group                      |
| 12  | 26 June 2014 | Musa Saidi Mgametwa          | Project Manager                          | Ufugaji wa samaki                 |
| 13  | 26 June 2014 | Hassan                       | Accountant                               | Ufugaji wa samaki                 |
| 14  | 26 June 2014 | Ernest Mundu                 | Director                                 | TALIA                             |
| 15  | 26 June 2014 | ??????                       | Accountant?                              | TALIA                             |
| 16  | 27 June 2014 | Mr. Oscar                    | District Executive Director              | District Council, Mtwara          |
| 17  | 30 June 2014 | Norton                       | Field Officer (also Deputy Head?)        | KIMWAM                            |
| 18  | 30 June 2014 | Abdul                        | Accountant (?)                           | KIMWAM                            |
| 19  | 30 June 2014 | Juma Napinda                 | Information Officer                      | TCCIA, Mtwara                     |
| 20  | 1 July 2014  | Mr. Mpaki                    | Municipal Engineer                       | Municipality, Mtwara              |
| 21  | 2 July 2014  | Eng. Patrick Kanyagha        | District Engineer                        | District Council, Mtwara Rural    |
| 22  | 3 July 2014  | Shaban K. Millao             | District Head of Planning                | District Council, Mtwara          |
| 23  | 3 July 2014  | Rew Revealed Kataru          | Programme Director                       | Aga Khan Foundation, Mtwara       |
| 24  | 3 July 2014  | Eng. Daniel Kyando           | Planning Engineer                        | TANESCO, Mtwara                   |
| 25  | 6 July 2014  | Basil Kayombo                | District Manager                         | TANESCO, Masasi                   |
| 26  | 6 July 2014  | Ildefonce Arthur             | Acting District Manager                  | TANESCO, Newala                   |



| No. | Date         | Name   | Position                                  | Organisation                      |
|-----|--------------|--|---|-----------------------------------|
| 27  | 6 July 2014  | Elias  | Electrician                               | TANESCO, Mtwara Regional Office   |
| 28  | 6 July 2014  | Peter D. Mwaimu                                      | District Manager                          | TANESCO, Tandahimba               |
| 29  | 9 July 2014  | Gabriel Wikola                                       | Regional Manager                          | TANROADS                          |
| 30  | 10 July 2014 | Joseph Simbakalia                                    | Regional Commissioner                     | Regional Office, Mtwara           |
| 31  | 14 July 2014 | Elinsa Nyange  | Regional Manager                          | TRA, Mtwara                       |
| 32  | 18 July 2014 | Alfred Luanda  | Regional Administrative Secretary         | Regional Office, Mtwara           |
| 33  | 4 Aug. 2014  | Saidi Mongomongo, Engeltrand Mbemba, Andrew Chibwana | Reg. Manager and staff                    | TEMESA, Mtwara                    |
| 34  | 5 Aug. 2014  | Damas Kamala   | Officer                                   | TRA, Mtwara                       |
| 35  | 6 Aug. 2014  |  | IT Officer                                | TANESCO, Mtwara                   |
| 36  | 12 Aug. 2014 | Bengiel Msofe  | Head Engineer                             | REA, Dar es Salaam                |
| 37  | 18 Aug. 2014 | Eng. Mahende Mugaya                                  | Zonal Manager                             | TANESCO, Dar es Salaam            |
| 38  | 20 Aug. 2014 | Eng. Sophia Mgonja                                   | Senior Manager Distribution               | TANESCO, Head Office              |
| 39  | 20 Aug. 2014 | Eng. Himson Exand                                    | Engineer                                  | TANESCO, Head Office              |
| 40  | 25 Aug. 2014 | Eng. Juma Mkoby                                      | Assistant Commissioner Energy Development | Ministry of Energy, Dar es Salaam |
| 41  | 26 Aug. 2014 | John Kabadi  | Senior Manager Strategic Planning         | TANESCO, Head Office              |
| 42  | 28 Aug. 2014 | Msafiri Mtepa  | Officer                                   | EWURA                             |

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